11.03.07

Exxon Valdez Oil Spill Trustee Council

441 W. 5th Ave., Suite 500 • Anchorage, Alaska 99501-2340 • 907/278-8012 • fax 907/276-7178

MEMORANDUM

TO: Trustee Council

FROM: Molly McCammon
Executive Director

DATE: October 15, 2002

RE: Northern Afognak habitat protection

Pre-acquisition work is close to complete for a possible habitat package for Northern Afognak Island. An appraisal is currently under review by federal and state reviewers, but will not be complete by the October 29th meeting. We will be discussing the appraisal in executive session that day, and I will be discussing it with you individually prior to that.

Alex Swiderski from the Alaska Department of Law, on behalf of the State of Alaska, and myself will be meeting with representatives of the sellers (Roy Jones, Tim Richardson, and Glenn Williams) on Friday, October 25 to discuss the framework of a possible proposal to bring to you for consideration. The sellers' representatives also will be meeting with you individually before the meeting and will be present on Tuesday, October 29th.

For your information, I've included materials relating to the proposal that were included in earlier Trustee Council packets.

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SHUYAK

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KONIAG

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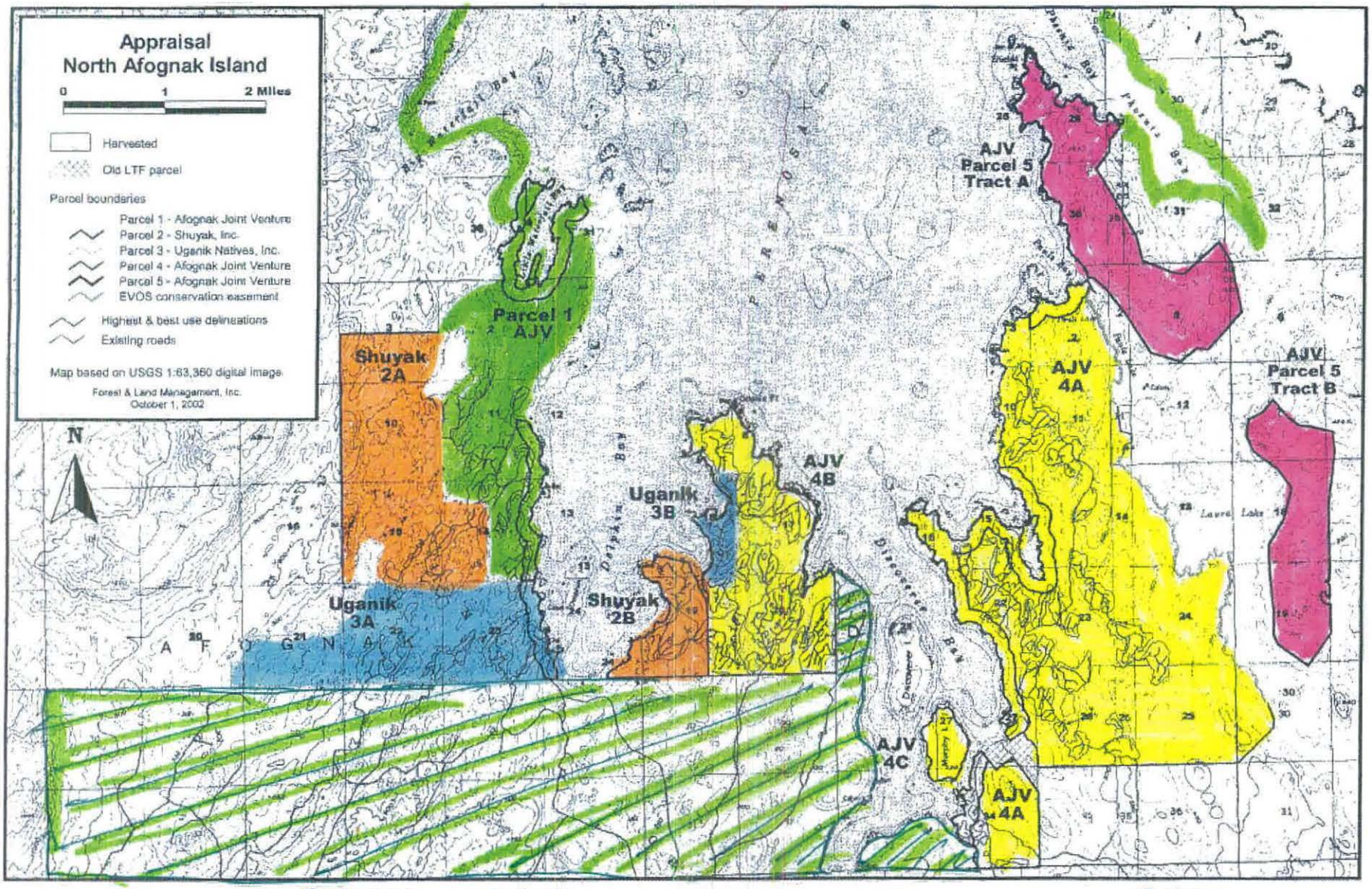
CONFIDENTIAL



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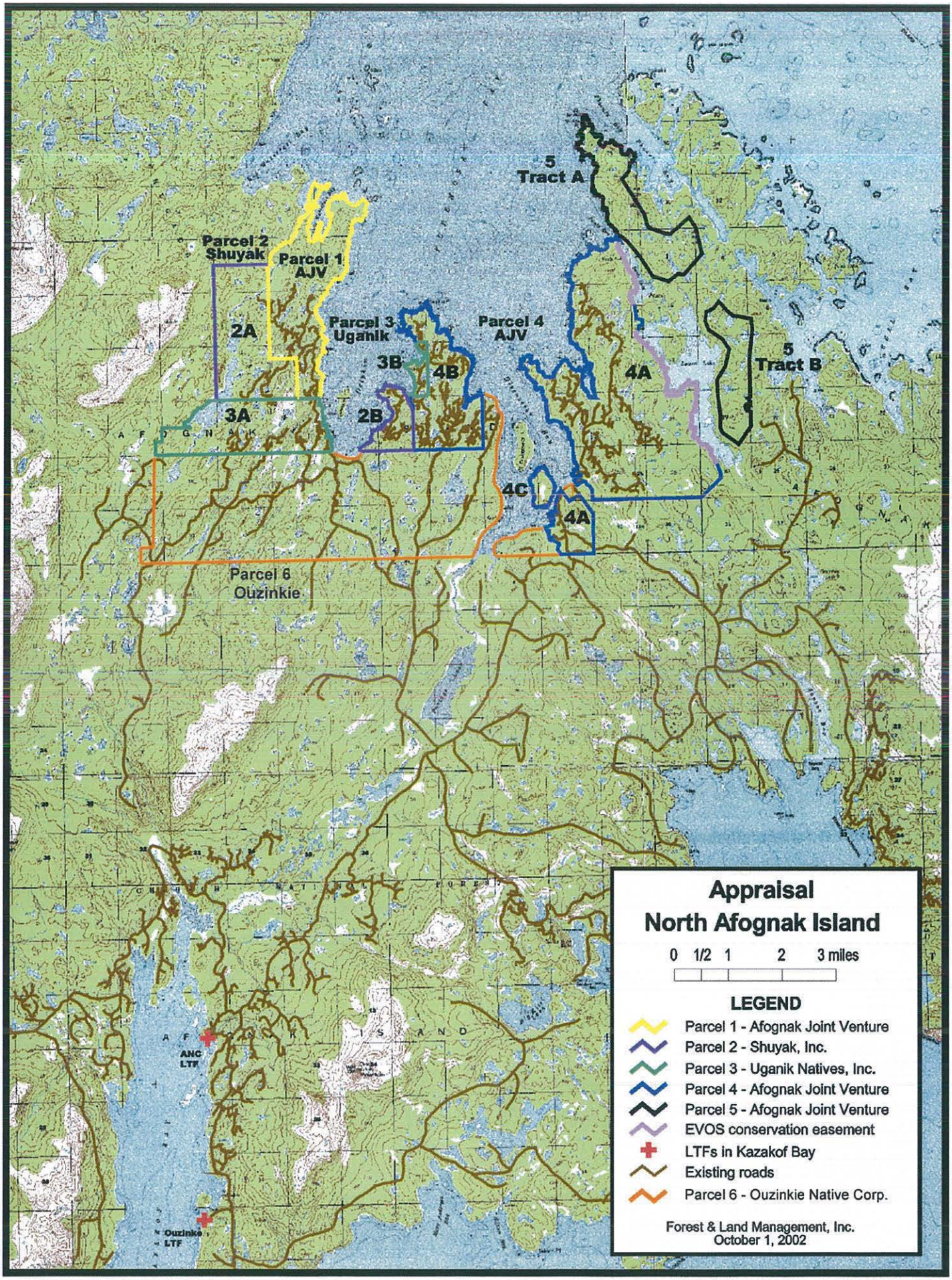
5
Tract A
Parcel 2
Shuyak
Parcel 1
AJV
2A
Parcel 3
Uganik
3B
4B
Parcel 4
AJV
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Tract B
3A
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4C
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Parcel 6
Ouzinkie
ANC
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Ouzinkie
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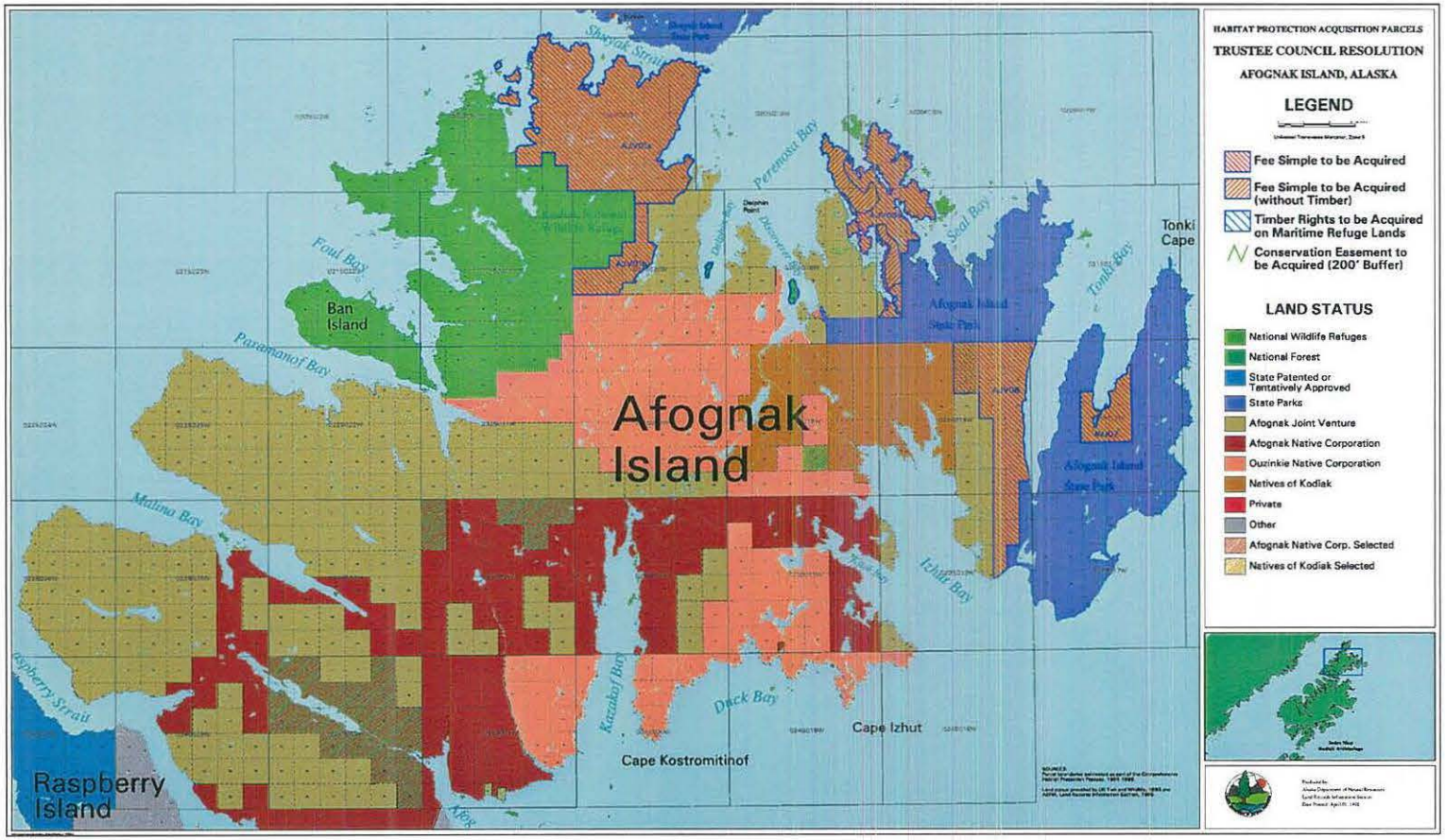
Appraisal
North Afognak Island
0 1/2 1 2 3 miles
LEGEND
Parcel 1 - Afognak Joint Venture
Parcel 2 - Shuyak, Inc.
Parcel 3 - Uganik Natives, Inc.
Parcel 4 - Afognak Joint Venture
Parcel 5 - Afognak Joint Venture
EVOS conservation easement
LTFs in Kazakof Bay
Existing roads
Parcel 6 - Ouzinkie Native Corp.
Forest & Land Management, Inc.
October 1, 2002


HABITAT PROTECTION ACQUISITION PARCELS
TRUSTEE COUNCIL RESOLUTION
AFOGNAK ISLAND, ALASKA
LEGEND
Fee Simple to be Acquired
Fee Simple to be Acquired (without Timber)
Timber Rights to be Acquired on Maritime Refuge Lands
Conservation Easement to be Acquired (200' Buffer)
LAND STATUS
National Wildlife Refuges
National Forest
State Patented or Tentatively Approved
State Parks
Afognak Joint Venture
Afognak Native Corporation
Ouzinkie Native Corporation
Natives of Kodiak
Private
Other
Afognak Native Corp. Selected
Natives of Kodiak Selected
Afognak Island
Raspberry Island
Ban Island
Tonki Cape
Cape Kostromitinof
Cape Izhut
Shuyak Strait
Perenosa Bay
Foul Bay
Paramanof Bay
Malina Bay
Raspberry Strait
Kazakof Bay
Deck Bay
Izhut Bay
Seal Bay
Tonki Bay
Afognak Island State Park

THE WALL STREET JOURNAL. ★★★★

MONDAY, AUGUST 26, 2002

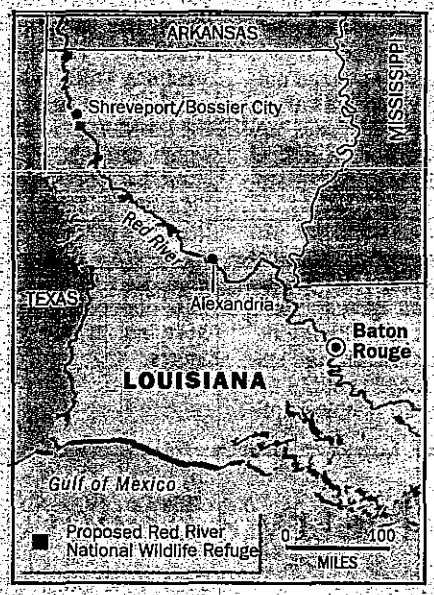
Entergy Gives Land to Create Refuge, Win Emissions Credit

By JOHN J. FIALKA

WASHINGTON—In the first of what the Interior Department hopes will be a series of public-private partnerships to create new federal wildlife refuges without taxpayer funds, Entergy Corp. is donating 600 acres of land along Louisiana's Red River to the government.

Trees planted on the land will absorb and store an estimated 275,000 tons of carbon dioxide, a greenhouse gas blamed for global warming. The utility will get credit for that if the U.S. ever decides to regulate CO_2 emissions.

"This is a model that we hope to use in other places," said Interior Secretary Gale Norton. The land would be the first chunk of a 50,000-acre Red River National Wildlife Refuge that was authorized by Congress in 2000 but never funded. Secretary Norton said the department is looking for other contributors to buy and donate land in four areas designated for the refuge, which the U.S. Fish and Wildlife Service will manage.



Jim Mutch, an Entergy vice president, said the prime interest of the company, one of the nation's five largest utilities, is to get credit for planting 180,000 native trees on the land that absorb and store carbon dioxide, which the company's 25 fossil fuel-powered generating plants emit.

70-Year Guarantee

The partnership with the Interior Department, which was arranged by the Conservation Fund of Arlington, Va., will guarantee that the trees won't be harvested during the 70-year-life of the project, providing a record that would give Entergy a credit if the nation regulates man-made CO_2 emissions.

Currently, according to the Energy Department, which maintains a register of voluntary corporate efforts to track and report emissions and emission reductions, 222 companies have filed reports of such efforts. Entergy of New Orleans is one of at least 37 companies agreeing to make long-term reductions in emissions; one way of doing this is offsetting industrial emissions by planting trees for what is called "carbon sequestration."

An energy bill pending in the Senate would, if the House concurs, impose mandatory controls on carbon-dioxide emissions if 60% of the nation's major companies don't register voluntary reductions with the government over the next five years. "Regardless of whether or not we get credit down the road, we just think this is the morally right thing to do," Mr. Mutch said.

Farmers Are Selling

The Conservation Fund arranged the $500,000 purchase of land from farmers in the area. "Our feeling was that unless we helped create these demonstration projects, all we're going to have is rhetoric about curbing climate change," said Patrick F. Noonan, chairman of the fund.

"We've got a lot of willing sellers," added Mr. Noonan, who said the land was often-flooded bottomland along the river that had been timbered starting in the 1960s by farmers to grow corn and soybeans. By restoring native hardwood trees and then donating the land, he said, Entergy is re-creating the area's natural environment, one that is more attractive to migrating waterfowl and other animals.

"We've got corporations sitting on the sidelines watching this one," he added. "It reflects the emerging carbon market." Under the Kyoto Protocol to curb climate change, companies would get tradeable credits for reducing emissions below target levels set by the treaty. Because the U.S. isn't a party to the treaty—which may be fully ratified by other industrial nations early next year—credits recorded in the U.S. would yield economic benefits only if the U.S. decided to join the treaty, or set up an independent greenhouse-gas regulatory program.

Eileen Claussen, head of the Pew Center on Climate Change, which has been lobbying for the Kyoto treaty in the U.S., noted that carbon sequestration by forests isn't a permanent solution, because carbon is released back into the atmosphere when trees are burned or when they rot. "But we think all of this stuff is good," she added, referring to the Entergy project. "We think the more we do in this, the more we learn."

Revision 8-2-02

MEMORANDUM
Department of Natural Resources

State of Alaska
Office of the Commissioner

TO: Molly McCammon
Executive Director
Exxon Valdez Oil Spill Trustee Council

DATE: August 2, 2002

TELEPHONE NO: 269-8431

FROM: Carol Fries
Natural Resource Manager

SUBJECT: EVOS Habitat Protection
Funding AJV Lands Rev.

The Department of Natural Resources supports the acquisition of additional AJV lands on the northern shore of Afognak Island. Completion of this acquisition would provide for a consistent management scheme on the northern tier of Afognak Island. Public access and recreational use of this area will be ensured and users will enjoy consistency in terms of permitting, regulations, and opportunities for recreational hunting, fishing, camping, and subsistence use.

Should the Council choose to support the acquisition of remaining AJV lands located on Northern Afognak Island, DNR will need to pursue the following activities in support of this acquisition. Support costs associated with these activities are estimated below. Please note that these costs are only estimated based on previous experience at this point in time. This memo has been revised based on new acreage figures provided by the organizations coordinating this acquisition effort.

Appraisal Review
A review of the timber component of the appraisal will be required.
Estimated cost: Contractual $5,000
A review of the land component of the appraisal and the final appraisal will be required.
Estimated cost: Contractual $7,500

Title Review
A comprehensive review of title will need to be conducted prior to closing. In the past the majority of this work has been provided via contract acceptable to both the US and the State. Further in house review is required in order to verify legals and confirm title prior to closing.
Estimated cost: Contractual: $11,000
Personal Services: $7,000

Hazmat Survey and Site Inspection

A level one hazmat survey with site inspection will be required prior to closing.

Estimated cost: Travel: $2,400
Personal Services: $7,000

Total estimated expenses: $40,000

{ see attached budget. Actual total, including GA, is $37,700 for FY 03. MW

Given the uncertainties associated with the delivery of the completed appraisal and the anticipated timetable for negotiations, DNR expects that funding could be allocated between the FY02 and FY03 fiscal years as follows:

FY02 - $5,000 — { This amount will be covered by ADNR's existing 02126 budget. These funds are for review of the timber appraisal — the following paragraph refers to this $5,000. MW

FY03 - $35,000

Because the appraisal work for this acquisition is being done by the Kodiak Brown Bear Trust, American Lands Conservancy, Rocky Mountain Elk Foundation and others it is impossible to predict whether these expenditures will be incurred in fiscal year 02 or fiscal year 03. If the expenditures are not made in 02 it will be necessary for the TC to reauthorize them in 03.

Should you have any additional questions or concerns, please do not hesitate to contact me at your earliest convenience. It would be beneficial if this matter could be addressed at the August 6 Trustee Council meeting. Thank you.

cc: Marty Rutherford

#870

RESOLUTION 02-02 OF THE *EXXON VALDEZ* OIL SPILL TRUSTEE COUNCIL CONCERNING PROTECTION OF LANDS IN PERENOSA BAY

WHEREAS the Trustee Council has invested nearly $156 million to acquire and protect habitat on and near northern Afognak Island that is critical for several species injured by the oil spill, consisting of 41,549 acres along Seal Bay and Tonki Cape acquired from the Seal Bay Timber Company in 1993, 26,665 acres acquired on Shuyak Island from the Kodiak Island Borough in 1996, and 41,750 acres acquired on northern Afognak Island from the Afognak Joint Venture (AJV) in 1998;

WHEREAS the Kodiak Brown Bear Trust, American Lands Conservancy, and Rocky Mountain Elk Foundation are proposing to seek private foundation dollars to leverage public funds to further the habitation protection and restoration efforts begun by the Trustee Council on northern Afognak Island;

WHEREAS the first phase of the effort is focused on 18,000 acres of coastal habitat in Perenosa Bay currently held by AJV;

WHEREAS the AJV lands lie within and near the lands purchased by the Trustee Council that are now within Afognak Island State Park and Shuyak Island State Park, and include timber rights on 2,000 acres of land east of Pauls and Laura Lakes on which the Trustee Council acquired surface title, and their protection would help preserve the integrity of the Trustee Council's investment in the area;

WHEREAS the Trustee Council sought to acquire these additional lands in order to provide contiguity in protection, land management strategies, and ownership but had insufficient funds available to purchase them;

WHEREAS protecting contiguous tracts of land provides further protection of wildlife movement corridors, consistency in land management strategies, and facilitates public recreational use in concert with protection of injured species and supporting habitats;

WHEREAS the AJV lands, as well as the timber reservation near Pauls and Laura Lakes, are among the lands most highly ranked for restoration value and biological significance by the Trustee Council's habitat protection process and support critical habitat for several species injured by the *Exxon Valdez* oil spill including pink salmon, Dolly Varden, Pacific herring, bald eagles, black oystercatchers, harbor seals, harlequin ducks, marbled murrelets, pigeon guillemots, river otters, and sea otters;

WHEREAS the Sitka spruce within the timber reservation represents some of the most valuable habitat for wildlife, particularly marbled murrelets and bald eagles, as well as providing stable riparian zones for pink and sockeye salmon and Dolly Varden;

WHEREAS this area has many documented anadromous streams which support populations of pink salmon, coho salmon, sockeye salmon, rainbow trout and steelhead which have significant importance to commercial fishing, subsistence fishing, sportfishing, guiding, as well as bears, eagles, and marine mammals;

WHEREAS Pacific herring spawn in Perenosa Bay and feed in nearshore waters;

WHEREAS six species of birds injured by the *Exxon Valdez* oil spill – marbled murrelet, pigeon guillemot, black oystercatcher, harlequin duck, bald eagle, and common murre -- use northern Afognak and the protected offshore waters for all or parts of their lifecycles;

WHEREAS the adjacent marine waters are highly productive and are inhabited by northern sea lions, northern fur seals, harbor porpoises, and several species of whales, with the nearshore waters of Perenosa Bay offering feeding, pupping, and calving habitat for many species of marine mammals including harbor seals and sea otters;

WHEREAS in addition to injured species, elk, deer and brown bear utilize the habitats proposed for protection and the resources they support;

WHEREAS the AJV lands in this general area contain significant archaeological and cultural resources, with some sites listed as Important by the State Historic Preservation Office;

WHEREAS protection of this area will further the Trustee Council's restoration objectives by maintaining water quality and riparian habitat for anadromous fish, river otters, and harlequin ducks; maintaining nesting opportunities for bald eagles, marbled murrelets and pigeon guillemots; minimizing disturbance to nearshore and intertidal habitat used by a variety of species; and maintaining opportunities for recreational use by Alaskans and tourists alike;

WHEREAS the Kodiak Brown Bear Trust, American Lands Conservancy, and Rocky Mountain Elk Foundation bring together knowledge of Alaska, successful experience in completing large and complex land acquisitions, private foundation support, and a significant national constituency;

THEREFORE BE IT RESOLVED that the Trustee Council strongly supports and encourages the efforts underway by the Kodiak Brown Bear Trust, American Lands Conservancy, Rocky Mountain Elk Foundation and others to seek funds for protection of the coastal habitat in Perenosa Bay.

Approved by the Council at its meeting of December 11, 2001 held in Anchorage, Alaska, as affirmed by our signatures affixed below:

DAVE GIBBONS
Alaska Region
USDA Forest Service

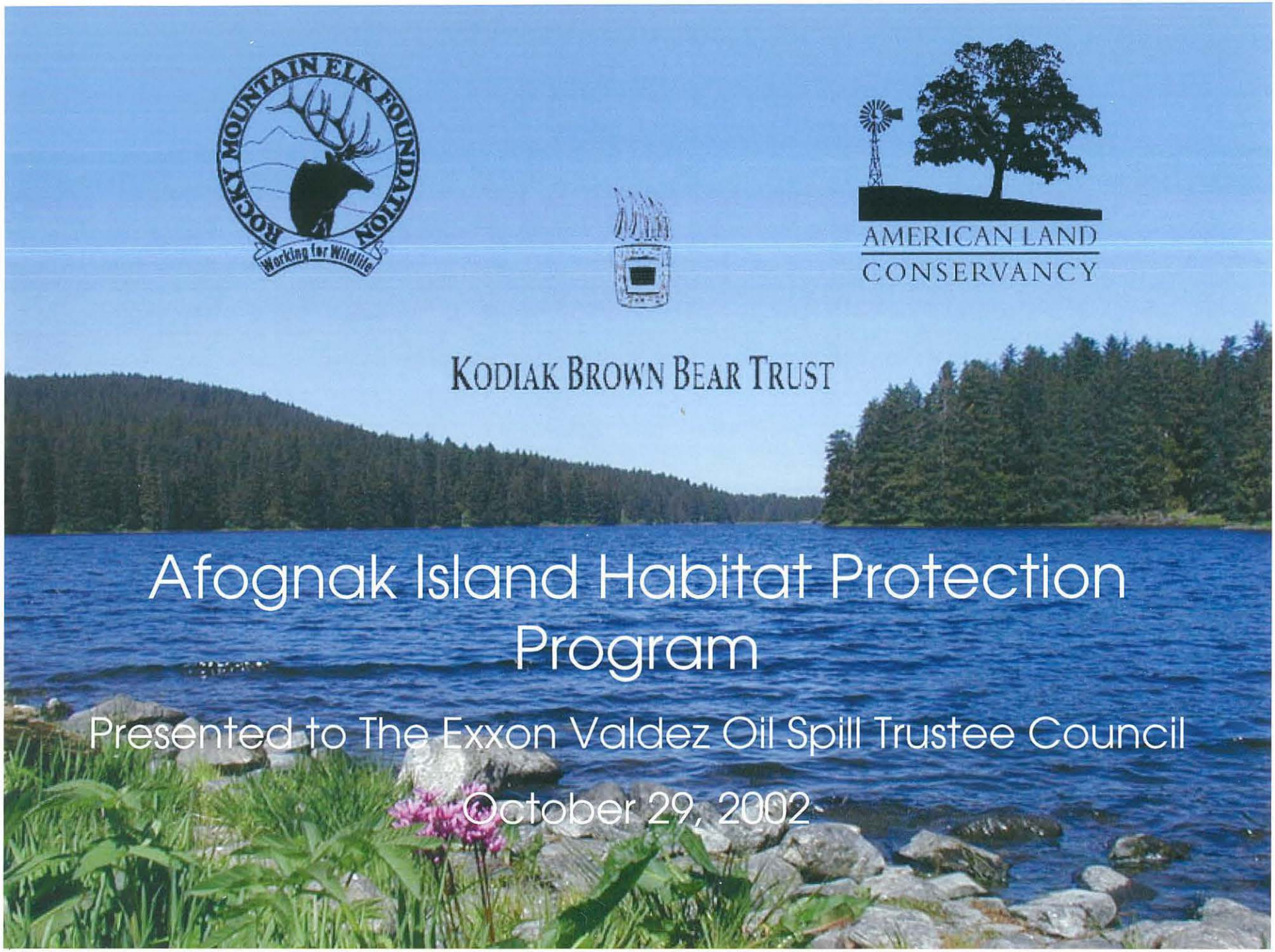
CRAIG TILLERY
Assistant Attorney General
State of Alaska

DRUE PEARCE
Senior Adviser
to the Secretary for Alaskan Affairs
U.S. Department of the Interior

JAMES BALSIGER
Director, Alaska Region
National Marine Fisheries
Service

FRANK RUE
Commissioner
Alaska Department of
Fish and Game

MICHELE BROWN
Commissioner
Alaska Department of
Environmental Conservation



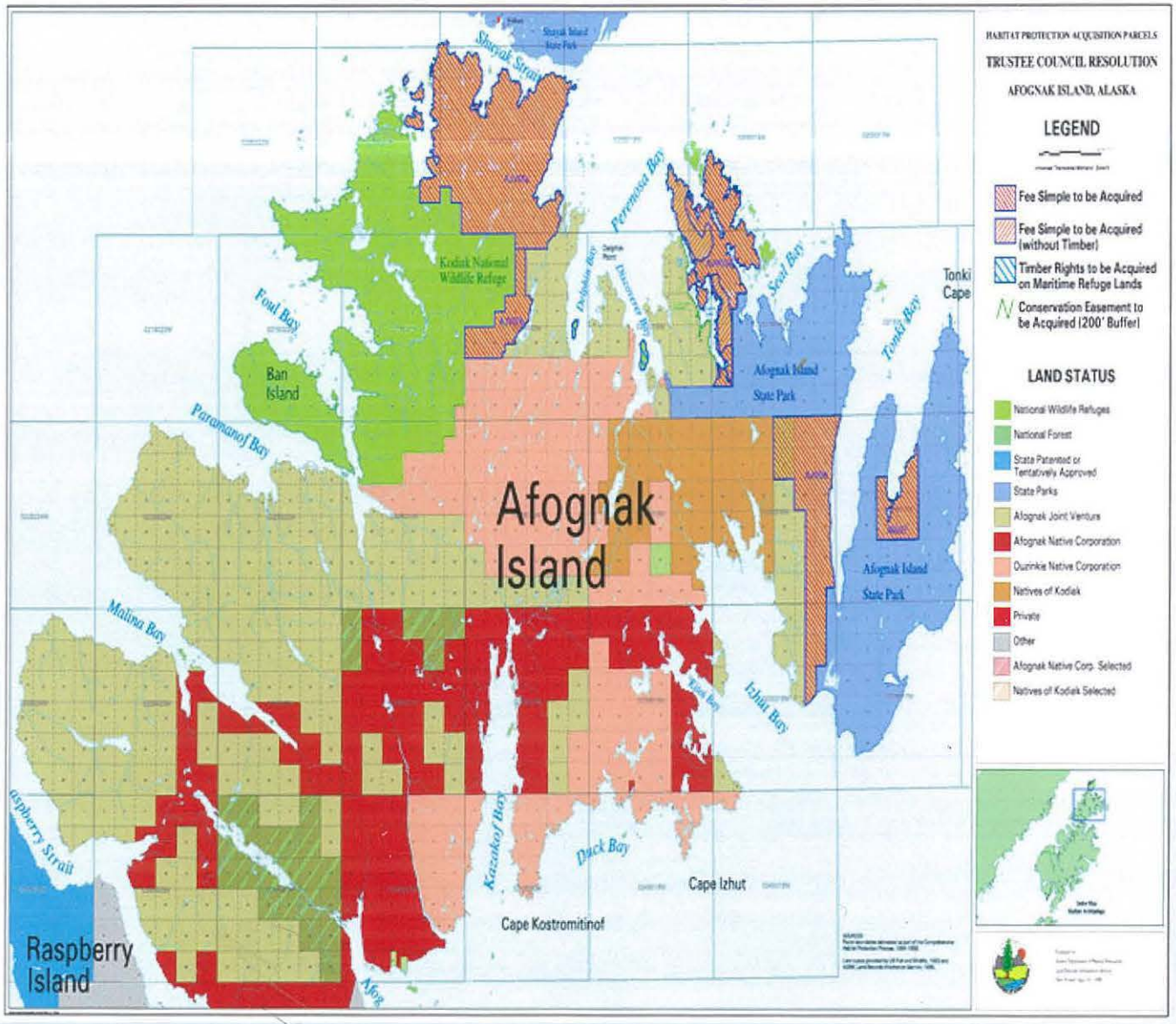
Afognak Island Habitat Protection Program

Presented to The Exxon Valdez Oil Spill Trustee Council

October 29, 2002

Protecting The EVOS Restoration Investment

- As part of its habitat restoration program, the EVOS trustee council protected more than 100,000 acres of oil impacted habitat on north Afognak and Shuyak Island.
- The Council has invested approx $156 million, creating Afognak Island State Park and completing Shuyak Island State Park – with more than two thirds of Afognak Island remaining in private ownership.



EVOS Habitat and Acquisition Protection Policies

""By purchasing land throughout the spill region, the Trustee Council has ensured that key habitats for Injured species will not be damaged further by extensive development or logging, serious threats at the time of the spill.

"The Trustee Council determined that in an already impacted environment, purchasing land could go a long way toward allowing the ecosystem to recover."

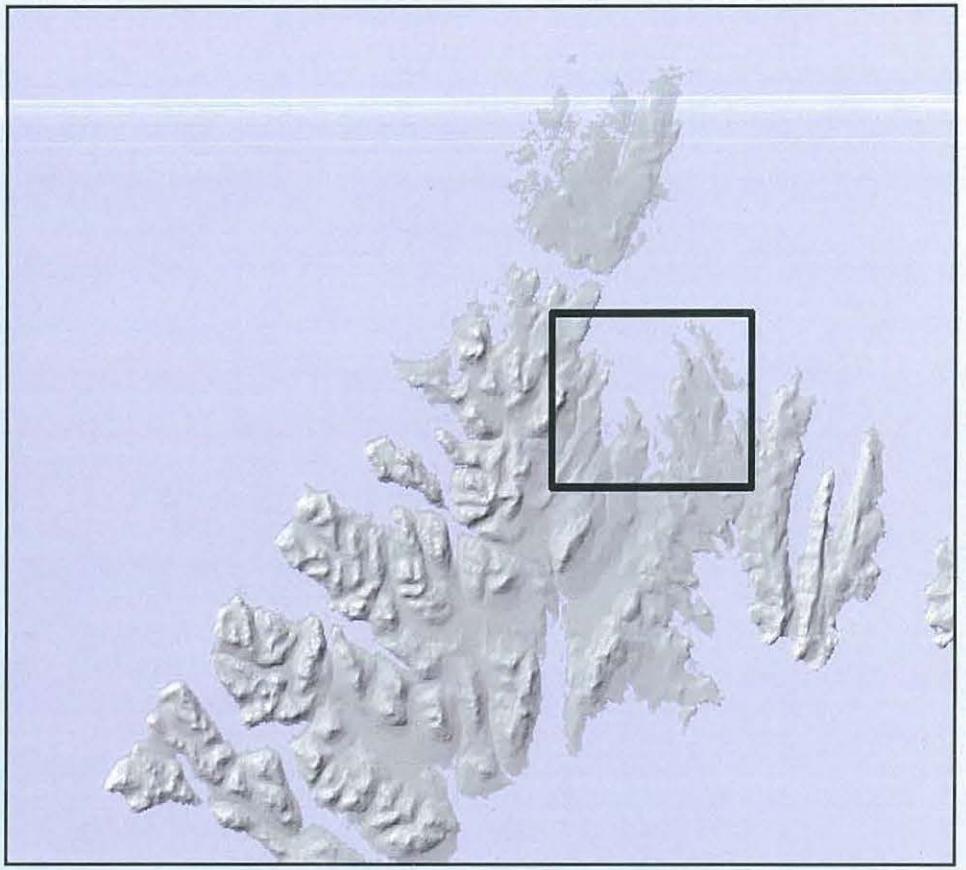
(EVOS Status Report 2002).

Perenosa Bay Restoration Values

- Perenosa Bay provides some of the most productive habitat for EVOS-injured species in the entire spill region – particularly for non-recovering species.

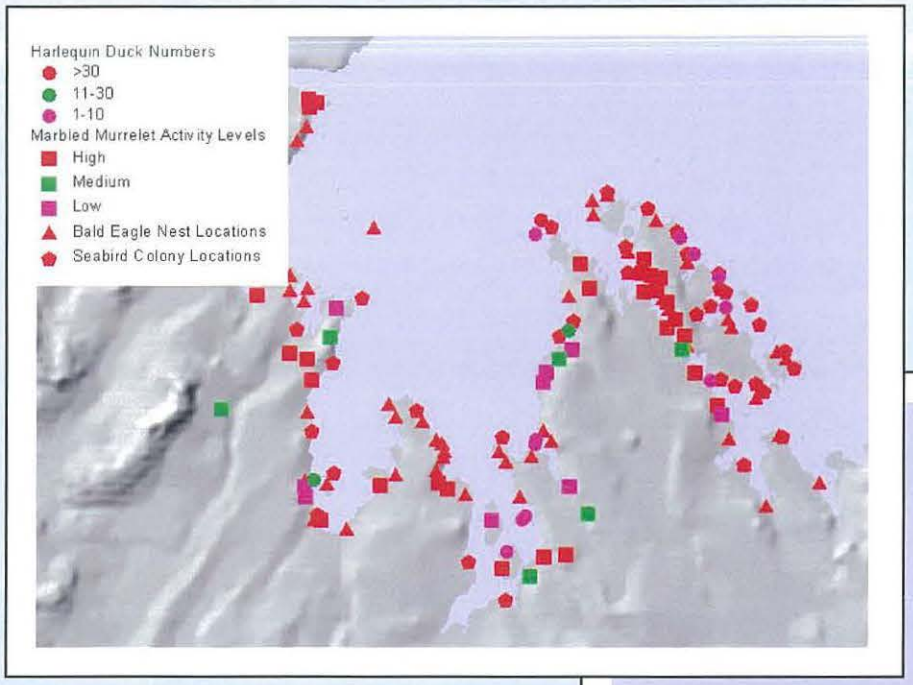
- <u>Not Recovering Species*:</u>
  - Common Loon
  - Cormorants (3 spp.)
  - Harbor Seal
  - Harlequin Duck
  - Pacific Herring
  - Pigeon Guillemot

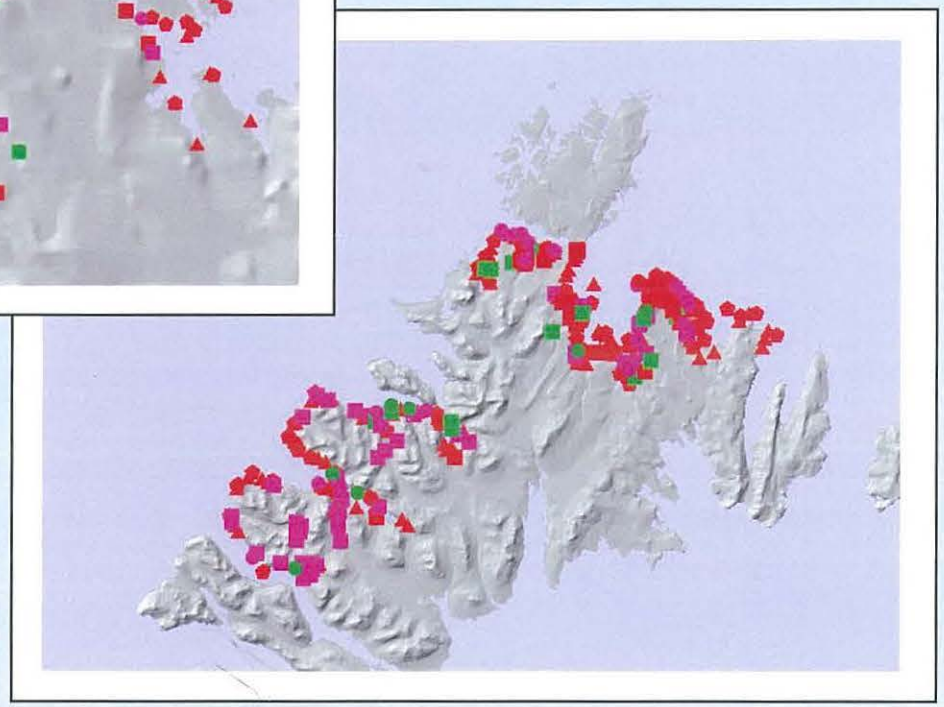
* *EVOS 2002 Status Report*



Northern Afognak Island showing the top priority project area, -Perenosa Bay.

Habitat for Over 160 Species of Birds and Waterfowl

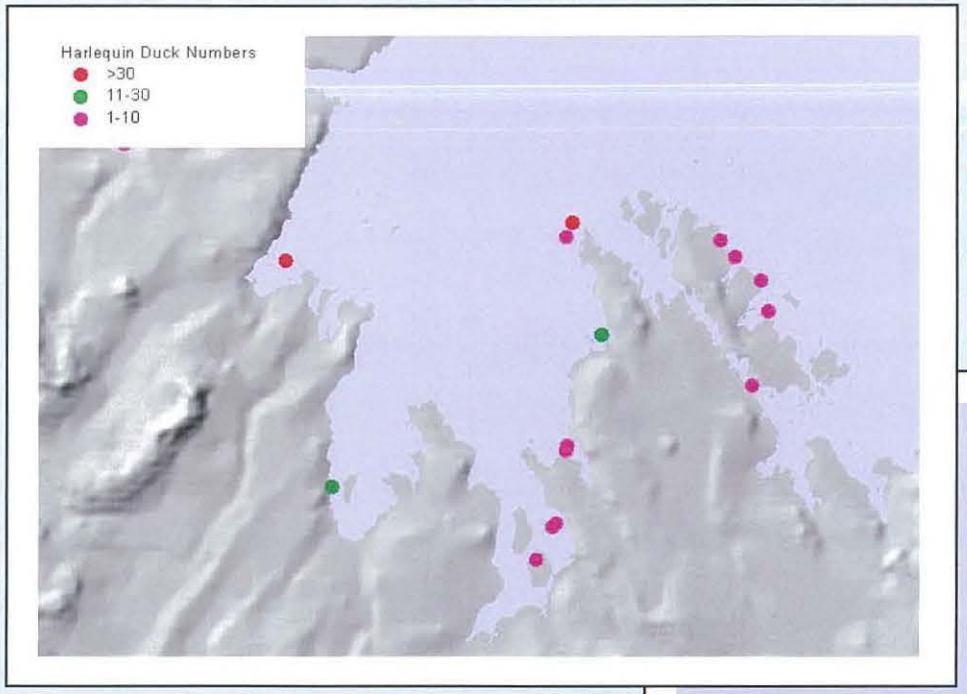


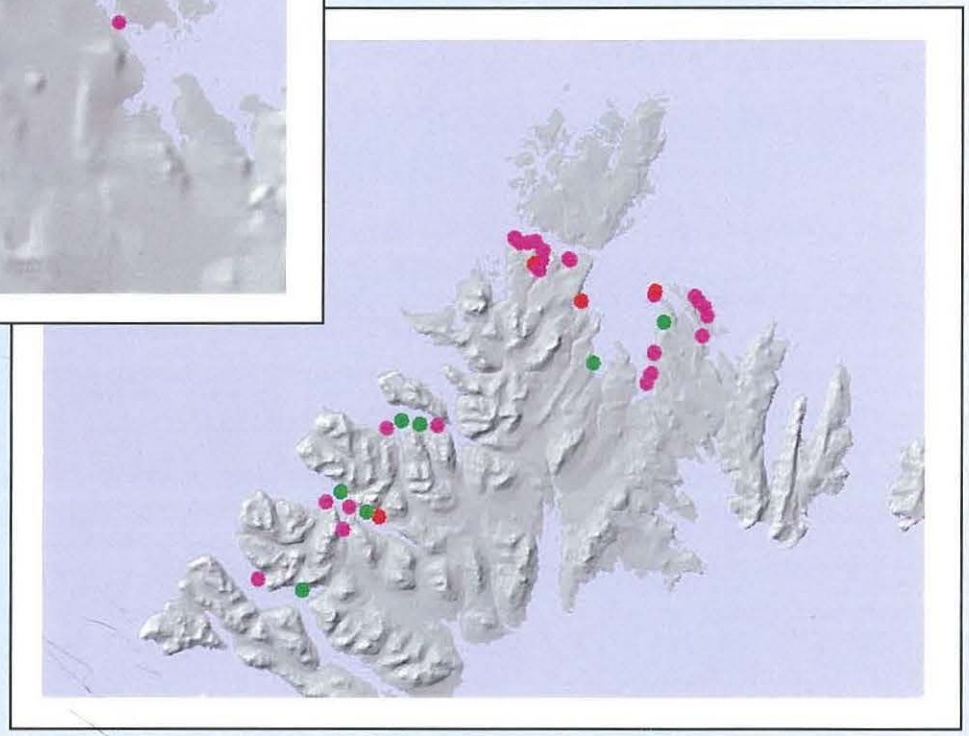


<u>Perenosa Bay (detail) and Afognak Island:</u> Six EVOS-injured species use northern Afognak for all or part of their life cycle: the Harlequin duck, bald eagle, marbled murrelet, pigeon guillemot, black oystercatcher, and common murre.

Harlequin Ducks

Perenosa Bay (detail) and Afognak Island

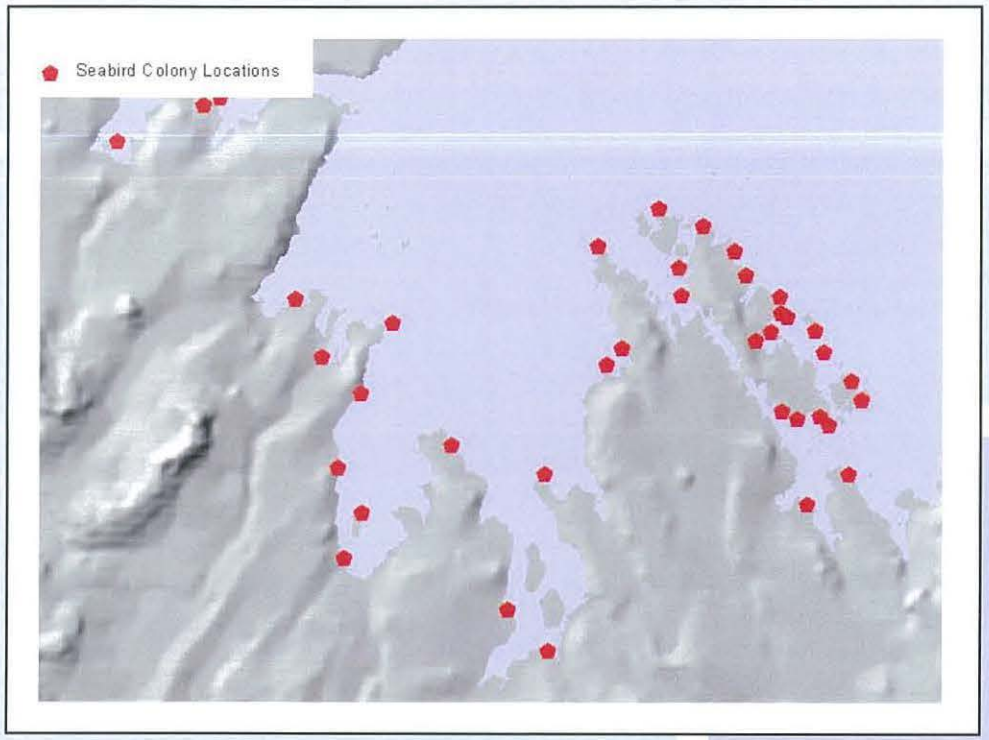


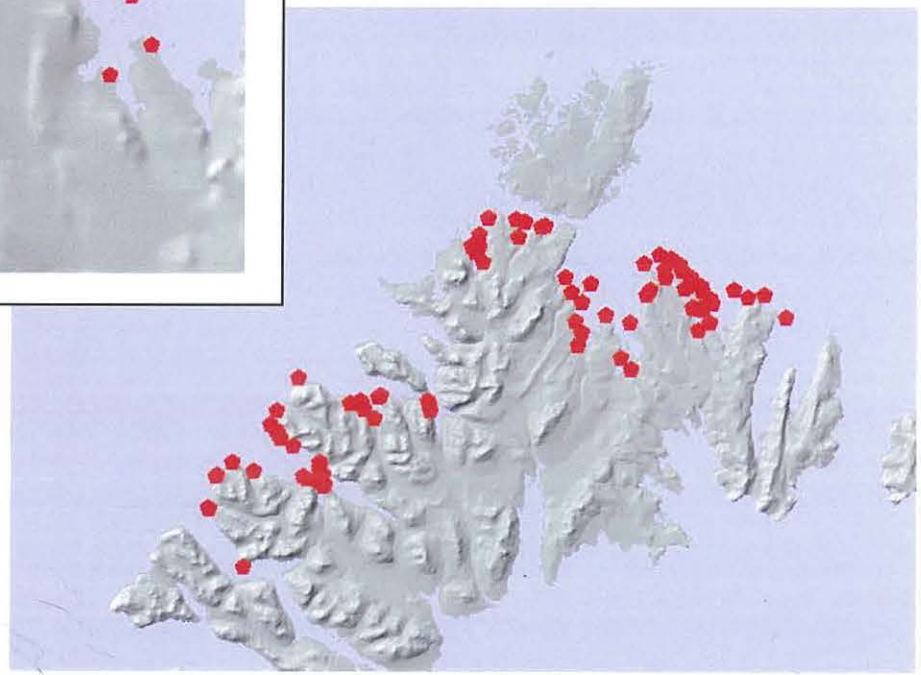


Kodiak Archipelago is home to one of only two resident Harlequin Duck populations in the world.
(US Fish and Wildlife Service)

Seabird Colonies

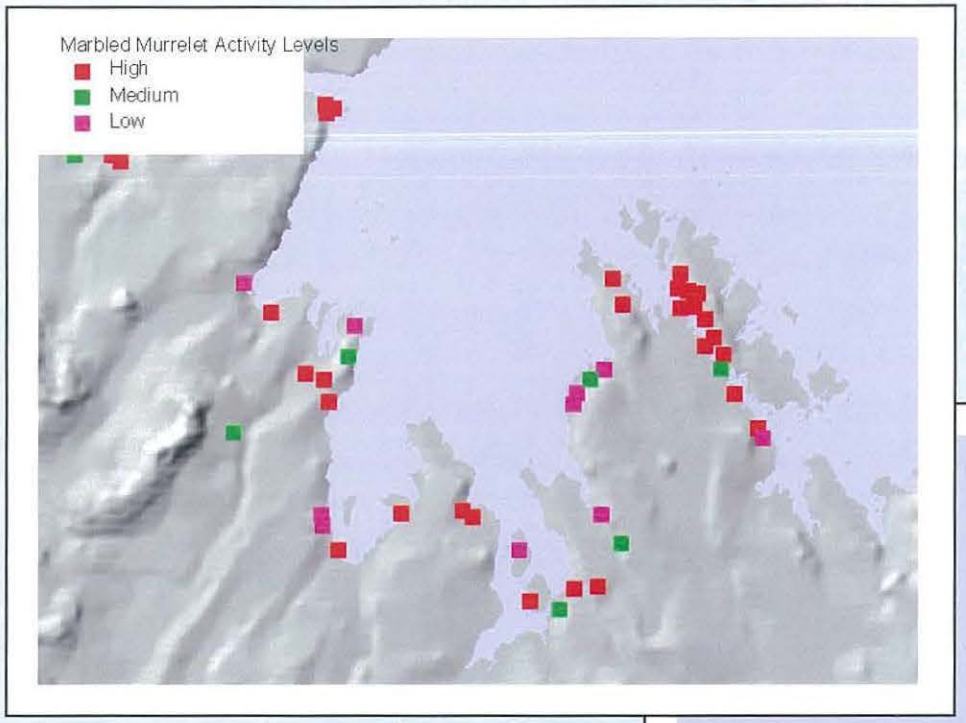
Perenosa Bay (detail) and Afognak Island

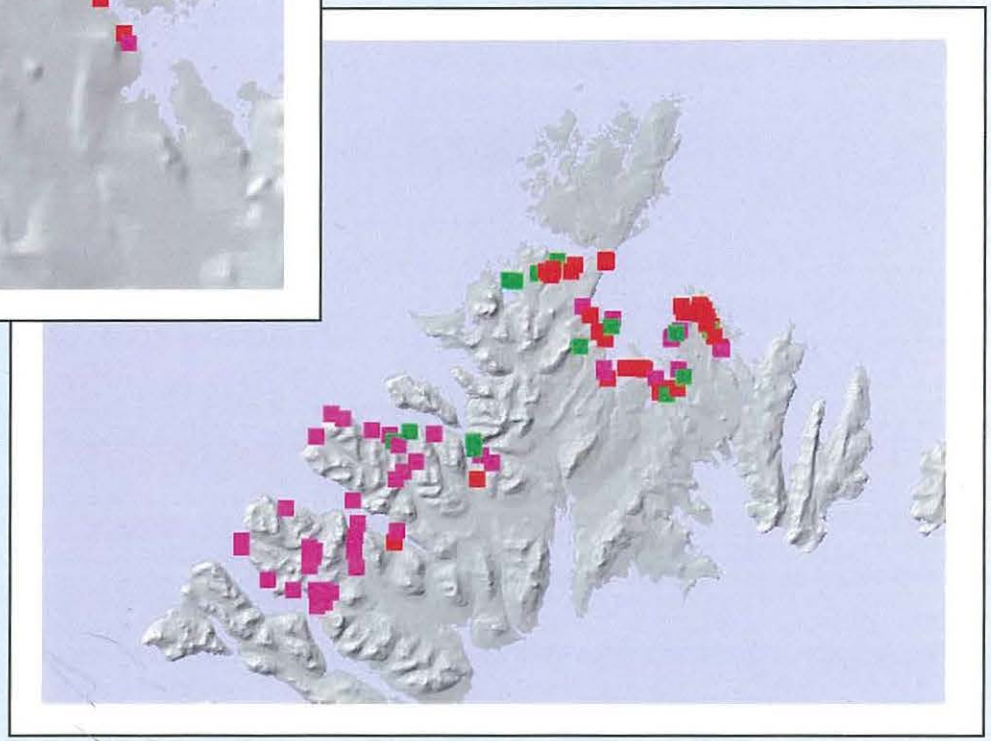




Marbled Murrelets

Perenosa Bay (detail) and Afognak Island





The Perenosa Bay project area contains a portion of what has been described as the worlds preeminent Marbled Murrelet habitat. (US Fish and Wildlife Service)

Home to Endangered Whales

Of the eight species of whales found in the northern Afognak Perenosa Bay project area, seven are on the endangered species list.

(National Marine Fisheries Service)

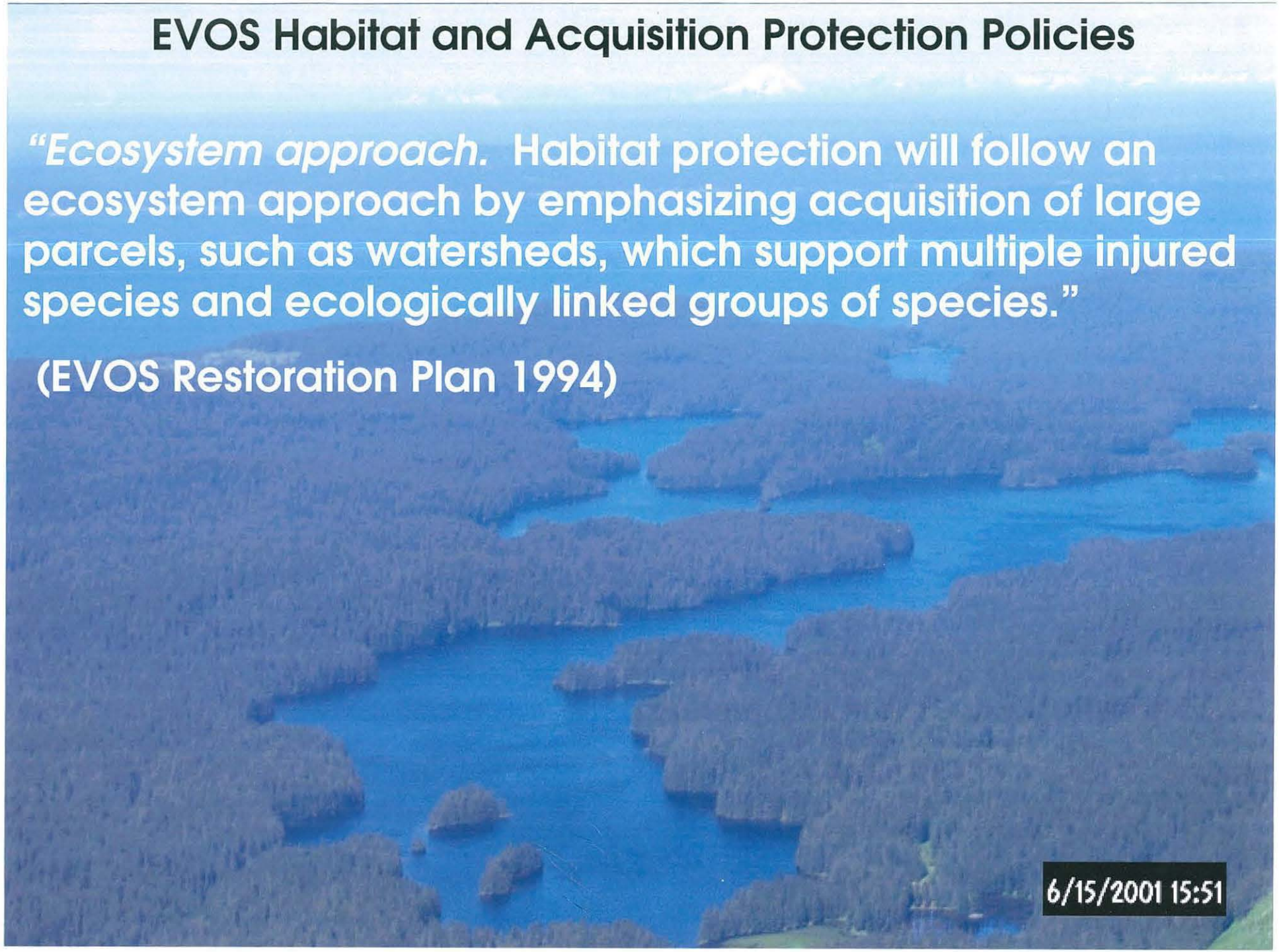
Rich Marine Mammal Habitat

- The near-shore waters of Perenosa Bay provide feeding, pupping and calving habitats to 14 species of marine mammal, including sea otters, killer whales, seals, harbor porpoises and sea lions.
- Marine mammal protection is a top priority for EVOS restoration programs.

EVOS Habitat and Acquisition Protection Policies

"Ecosystem approach. Habitat protection will follow an ecosystem approach by emphasizing acquisition of large parcels, such as watersheds, which support multiple injured species and ecologically linked groups of species."

(EVOS Restoration Plan 1994)

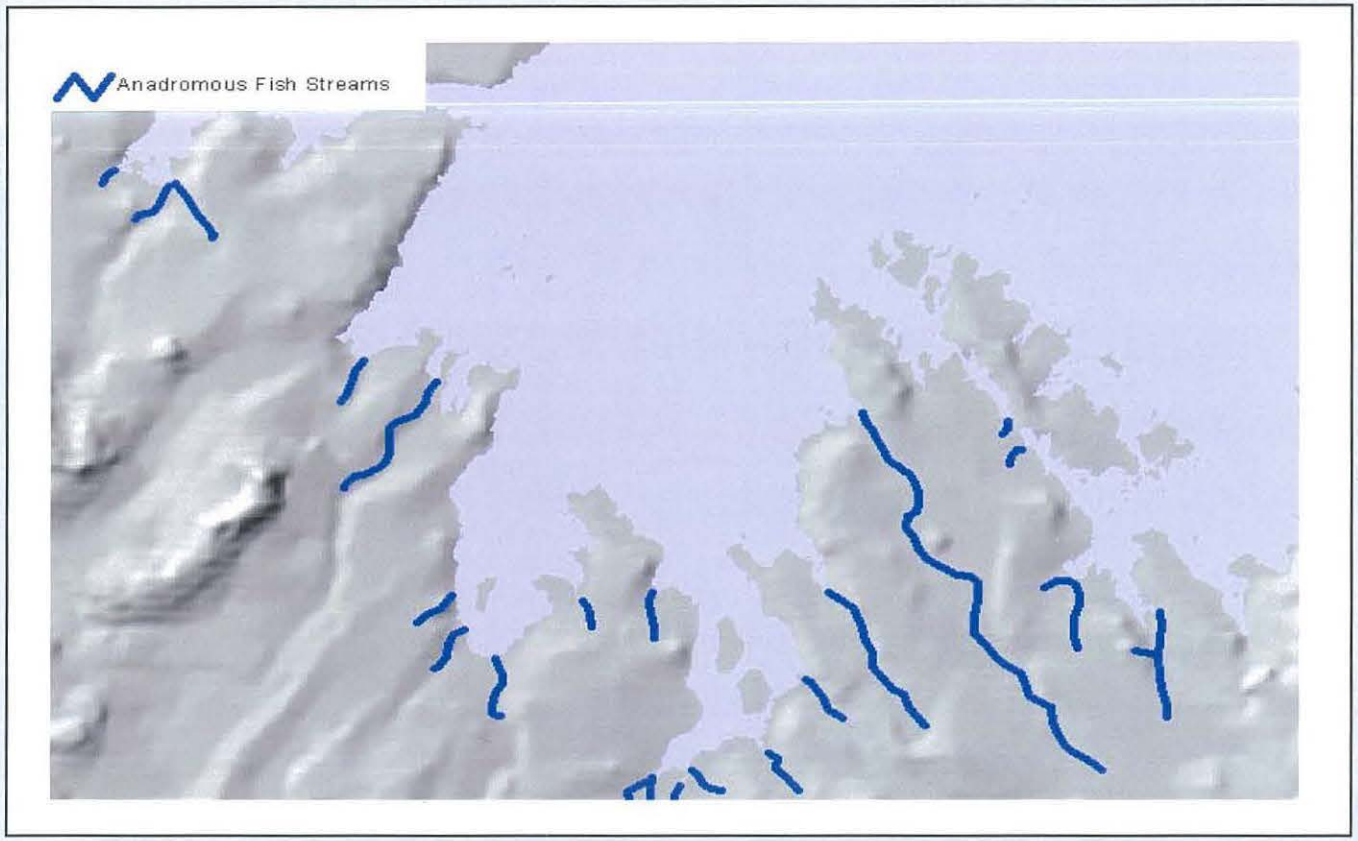


Forest Protects Anadromous Habitat

Old growth forest maintains the health of anadromous stream and lake systems on Afognak Island, nearly all of which are unprotected.

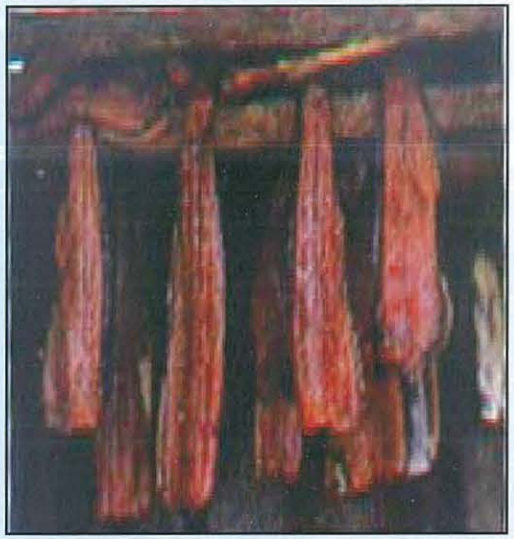
Salmon streams are a biological building block for the entire area, and a key food resource for Kodiak brown bears, eagles, and marine mammals.

High Density of Anadromous Fish Streams



Three unprotected rivers on Afognak Island produce more annual sockeye salmon escapement than all of Prince William Sound. Salmon streams in Perenosa Bay support commercial fishing, sport fishing, native subsistence fishing as well as the dependent animal communities.

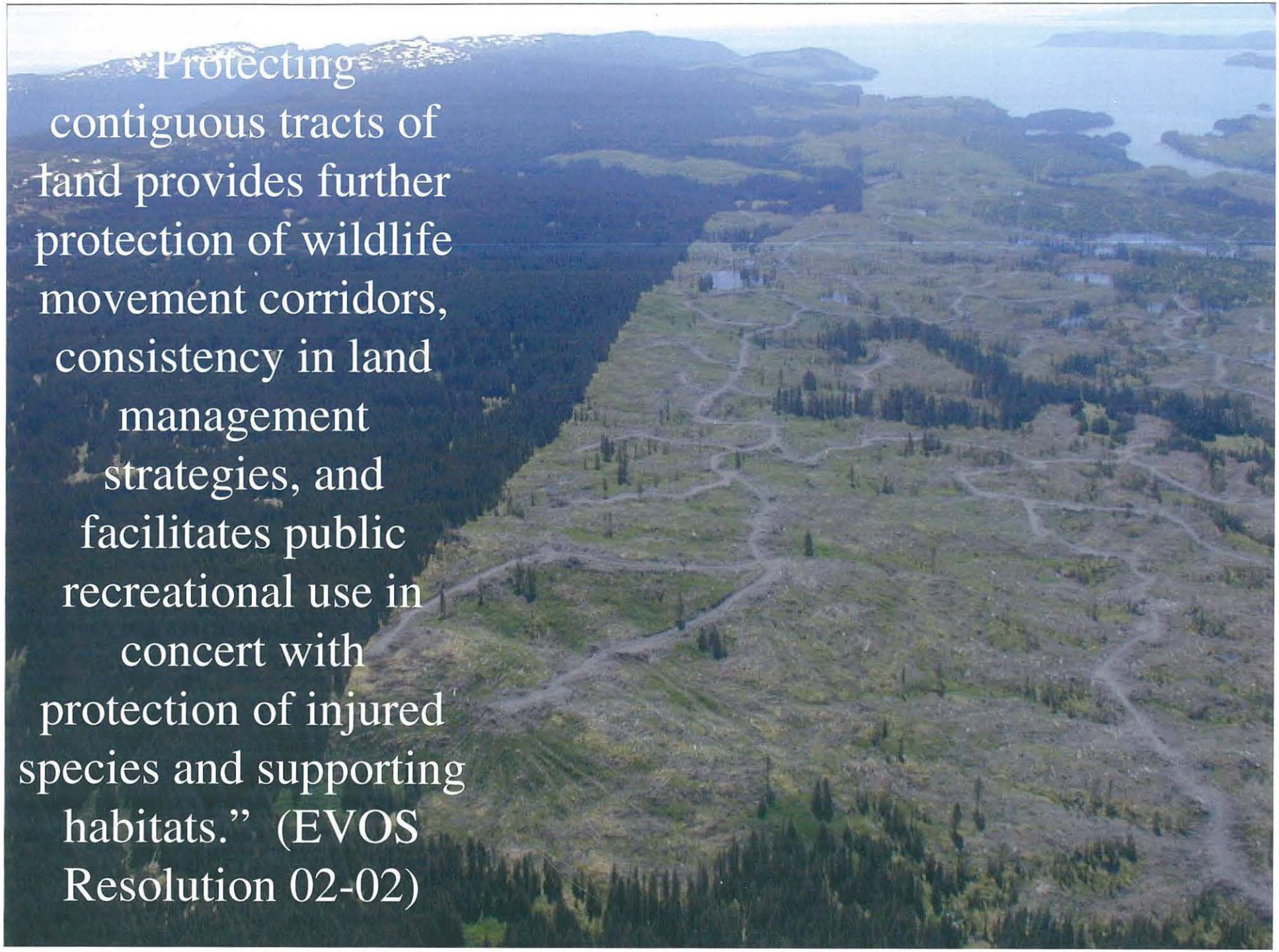
Protected Streams Support Commercial, Tourist, and Subsistence Fishing



Fragmentation of Ownership Also Threatens Success of Restoration Efforts

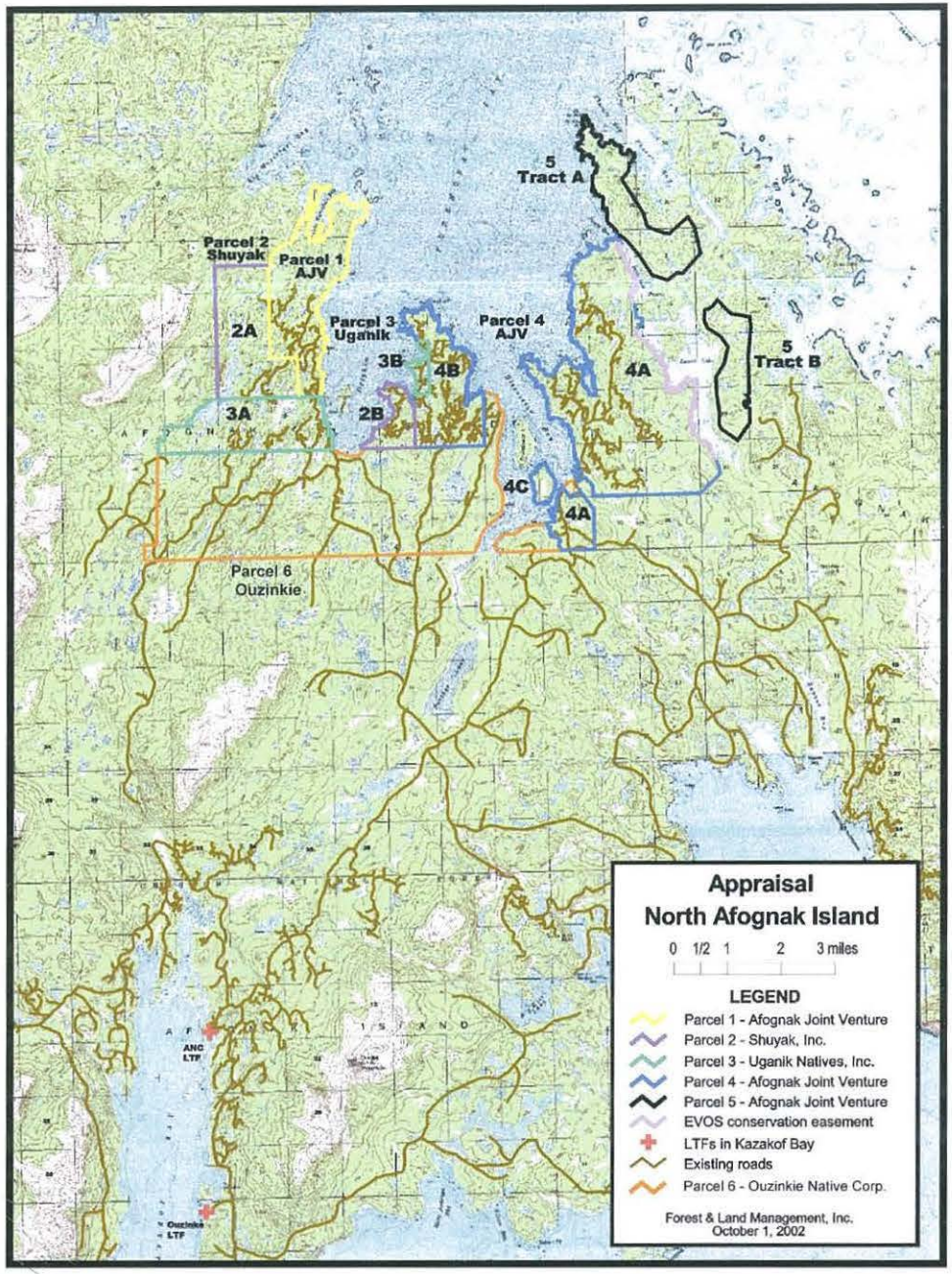
- The proliferation of small parcels is contrary to the restoration goals of the EVOS Trustee Council.
- A strong timber market may have helped to protect the biological integrity of northern Afognak in that land was retained in large blocks to facilitate timber harvest.
- With the largest landowner, Afognak Joint Venture (AJV), in the process of dissolution, one could imagine a massive fragmentation of ownership resulting in hundreds of private in-holdings – instead of just a small group acting as one.

View of Pauls Lake with AJV timber reservation to the right of the lake


Protecting contiguous tracts of land provides further protection of wildlife movement corridors, consistency in land management strategies, and facilitates public recreational use in concert with protection of injured species and supporting habitats." (EVOS Resolution 02-02)

The Restoration Opportunity

- The partner organizations seek to purchase the remaining AJV holdings in Perenosa Bay, a total of approximately 20,000 acres.
- In addition, the partners aim to purchase the rights to the timber reserve parcels within the State Park (tracts 5A and 5B).
- Purchase Option Agreements have now been signed with nine willing sellers (Native Corporation land owners) in Perenosa Bay.
- Appraisal work has been completed and is currently under review by the State and Federal Reviewers.




6/15/2001 15:55

Prepared by
Chugach Regional Resources Commission
for National Research Council
Nov. 2001

Tribal Ecosystem Stewardship Program

An Endowment for Tribal Involvement in the GEM Program

History and Background:

On March 24, 1989, the tanker *Exxon Valdez* ran aground off Bligh Reef in Prince William Sound, spilling at least 44 million liters of crude oil into eastern Prince William Sound. Oceanic tides and winds eventually carried oil, mousse, sheen, and tar balls more than 900 km along Alaska's southern coast. Devastated were lands, waters and resources in some of the most important subsistence and traditional use areas in Prince William Sound, Lower Cook Inlet, the Alaska Peninsula and Kodiak Island.

There are 20 Native communities in the oil spill affected area, comprising approximately 2,200 people. The Native people of these communities depend upon the land, water, and natural resources to maintain their cultural and traditional lifestyles and livelihood.

In the year following the oil spill, subsistence harvests declined by 77% compared to pre-spill numbers compiled by the Alaska Department of Fish & Game.[1] This is mostly due to the lack of available resources in traditional harvest areas and an uncertainty about the safety of these subsistence species that were available. Although a study of subsistence resource harvest was conducted in 1998 and showed an increase in the numbers of subsistence species harvested since the oil spill, people had to travel farther and hunt or fish longer in order to harvest at prespill levels.

As a result of the oil spill and the subsequent court settlement between the State of Alaska, the United States Government, and the Exxon Corporation, the *Exxon Valdez* Oil Spill (EVOS) Trustee Council was established. The Trustee Council is comprised of six trustees, representing three federal and three state agencies. These agencies include the Alaska Department of Fish & Game (ADF&G), the Alaska Department of Environmental Conservation, and the State Attorney General's Office for the state; and the Department of Interior, Department of Commerce (National Oceanic and Atmospheric Administration - National Marine Fisheries Service), and the Department of Agriculture (U.S. Forest Service) for the federal government. These six trustees, whose decision-making process is based on 100% consensus, are responsible for managing and administering the $900 million settlement fund through the administration of an established restoration work plan.[2]

Conspicuously absent is a Tribal Trustee who should be providing a voice for the Native communities affected by the oil spill. The Tribes were devastated by the oil spill and its effects upon their traditional use areas and lifestyle and requested active participation in the restoration activities of the Trustee Council. However, it wasn't until about 1994 that their requests for participation were heard. Up until then, research was being conducted in and around the communities without their involvement -- or knowledge, in many instances.

Without meaningfult Tribal involvement, the restoration work continued under four main components: 1) Research and Monitoring; 2) General Restoration; 3) Habitat Protection; and 4) Science Management, Public Information and Administration.

When this work plan was being implemented, the Trustees felt that a savings account should be established to allow for long-term research and monitoring in the Northern Gulf of Alaska (GOA). As a result, the Trustee Council has been setting aside $12 million each year to finance a long-term Gulf Ecosystem Monitoring (GEM) program that extends beyond the last payment from Exxon. These funds are placed in a reserve account until 2002, when it is expected that this fund will be worth approximately $170 million.

The Gulf Ecosystem Monitoring program was created to carry out the mission of the Exxon Valdez Oil Spill (EVOS) Trustee Council, which is to restore the fish and wildlife

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[1] Fall, James A., Subsistence Uses of Fish and Wildlife before and after the *Exxon Valdez* Oil Spill, 1996.
[2] Restoration Update newsletter, March-April 1998.

resources injured by the 1989 Exxon Valdez oil spill.[3] The mission of the GEM program is "to sustain a healthy and biologically diverse marine ecosystem in the northern GOA and the human use of the marine resources in that ecosystem through greater understanding of how its productivity is influenced by natural changes and human activities."[4] The GEM program has five major programmatic goals, as follows:

1. DETECT: Service as a sentinel (early warning) system by detecting annual and long-term changes in the marine ecosystem, from coastal watersheds to the central gulf;
2. UNDERSTAND: Identify cause of change in the marine ecosystem, including natural variation, human influences, and their interaction;
3. INFORM: Provide integrated and synthesized information to the public, resource managers, industry, and policy makers in order for them to respond to changes in natural resources;
4. SOLVE: Develop tools, technologies, and information that can help resource managers and regulators improve management of marine resources and address problems that may arise from human activities; and
5. PREDICT: Develop the capacity to predict the status and trends of natural resources of use by resource managers and consumers.[5]

Currently, the EVOS Trustee Council's GEM Program is undergoing review by the Polar Research Board's Committee to Review the Gulf of Alaska Ecosystem Monitoring Program. The Program document now comprises two volumes and the Trustee Council is continuously taking public comments on the current draft.

History of Community Involvement:

In April of 1994, the Trustee Council held their first Restoration Workshop. It was at this meeting that Tribal members made the point to the Trustees that the people who live, hunt, fish and gather in the spill area have knowledge that could help in the effort to better understand and restore the damage from the spill. They also expressed the desire to be better informed of the Trustee Council's research and restoration efforts, and to be more involved in the decision-making process. As a result of this meeting, a community involvement project was funded the following October. The project started small, hiring three community facilitators in Chenega, Tatitlek, and Port Graham. The duties included communicating traditional knowledge and local interests to project researchers and serving as the primary contact point between the villages and

[3] Gulf of Alaska Ecosystem Monitoring and Research Program, Volume 1, page ES-1
[4] Gulf of Alaska Ecosystem Monitoring and Research Program, Volume 1, page ES-2

the Trustee Council on oil spill related issues. The following year, the project was expanded to include five additional community facilitators, for the communities of Nanwalek, Cordova, Valdez, Seward, and Seldovia, as well as the two other regions within the oil spill impacted area, Kodiak Island and the Alaska Peninsula. This second year also included the hiring of a Tribal Community Involvement Coordinator who was housed at the Trustee Council office to serve as the liaison between the communities, the Trustee Council and researchers, and to coordinate the involvement of the communities in restoration projects. Prior to this, the coordinator was a Fish and Game employee. In addition, the Trustee Council's invitation document to submit proposals included a specific section on community involvement (developed by a panel of community representatives), as follows:

> *Create a forum for local traditional knowledge bearers and principal investigators to increase the exchange between culturally diverse groups in an effort to plan, implement and evaluate future restoration projects . . . Develop protocols to assist principal investigators and local communities in regard to contact with the communities and collection of traditional ecological knowledge, including methodology, data ownership, compensation, and data coordination (EVOS Trustee Council 1996a: 6 & 7)*

From 1996 through 1999, the program objectives remained similar to the first two years, with the exception of increased efforts to integrate traditional ecological involvement in the restoration process. Dr. Henry Huntington served as the TEK Specialist on this endeavor. He worked with the EVOS principal investigators in designing TEK components for their projects. He also conducted a series of workshops in the communities to introduce researchers to the community members, inform the communities about the project objectives, and to foster the free exchange of information between researchers and community members. As a result of this project, the Alaska Department of Fish and Game produced a Traditional Ecological Knowledge handbook intended to assist both the EVOS researchers and community residents in working with TEK. A Traditional Ecological Knowledge Database Reference Guide was also developed intended for use by EVOS researchers to identify sources of TEK in the EVOS area.

As a result of this project and the Trustee Council's commitment to including TEK in EVOS related research, TEK became the buzz word for funding proposals by many state and federal agencies. A number of proposals were submitted with TEK as the main focus, but no

[5] Gulf of Alaska Ecosystem Monitoring and Research Program, Volume I, page ES-2-3

involvement was included in the detailed project description for Native communities. At times, Tribes were deluged with requests for their knowledge. These frequent requests have made much of the Native community wary, and have raised concerns of ownership of information, confidentiality, loss of control over knowledge, compensation, credit for contributing to research, and intellectual property rights.[6]

In addition, according to Dr. Huntington, "the [TEK] workshops [conducted as part of the Community Involvement Program], while useful, did not achieve their goals." The workshop format may have been responsible in part. In most cases, the researchers gave formal presentations, similar to ones that might be given at a science conference. This sense of formality inhibited discussions from Tribal members during presentations. The researchers also experienced difficulties in communicating scientific information to a non western science audience.

One longer term goal was achieved, however. Several residents of one community (Tatitlek) were able to visit the research site on the sea duck study and help with the capture of the scoters for implantation of satellite transmitters. The researcher sent the birds' subsequent locations to the school, where students were able to track the migrations of "their" birds. Keeping residents informed and creating more opportunities for involvement in local research projects such as this can build bridges that will benefit future research, monitoring, and management activities.

In his study of three examples where TEK was incorporated into research, Dr. Huntington noted that TEK workshops where the main purpose is to "collect" TEK such as those held in this region, are " . . .more useful as the culmination of a larger study than as an isolated event." Further, he stated that further research should "provide a more systematic basis for identifying common elements of successful [TEK] workshops, evaluating the various factors that affect success, examining potentially divergent measures of success among workshop

[6] Miraglia, Rita, 1996, 1997, and 1998 EVOS Trustee Council Annual Reports for the Community Involvement Project.

participants, and understanding how workshops can best be used in conjunction with other means of drawing on both SK and TEK."[7]

As a result of the continuous funding support of the Community Involvement Program, the Trustee Council has funded a number of community-based projects. For example, a five year project was funded to conduct research on the feasibility of culturing, raising, and planting littleneck clams in local harvest areas, an archaeological repository project for artifacts, two youth area watch programs for the Kodiak and Chugach school districts, a study on the status of harbor seals and sea lions, as well as a biosampling program for harbor seals, to name a few. In addition, two conferences on subsistence and the oil spill were sponsored by the Trustee Council, a Subsistence Food Safety project (conducted prior to the development of the Community Involvement Program), a resource abnormality study, an octopus study, and a study on sea ducks. All of these projects utilized the traditional ecological knowledge of local experts in their studies.

In 1999, the Trustee Council also adopted a recovery objective for subsistence, which reads as follows:

> *Subsistence will have recovered when injured resources used for subsistence are healthy and productive and exist at prespill levels, and when people are confident that the resources are safe to eat. One indication that recovery has occurred is when the cultural values provided by gathering, preparing, and sharing food are reintegrated into community life (EVOS Trustee Council 1999a: 27).*

Although there were quite a number of projects funded that addressed subsistence issues, there were very few instances where funding was provided directly to the local community to administer and manage the project. This is due, in part, to the regulations which state that funding must go through a Trustee Council agency, the majority of which have no easy mechanism to pass funding through to the Tribes or Tribal organizations. As a result, state or federal agencies conduct the research themselves on behalf of the communities, oftentimes providing little or no funding to the Tribes or communities, but expecting their participation. The term community involvement has also been misinterpreted, with definitions ranging from a

[7] Huntington, Henry P., Patricia K. Brown-Schwalenberg, Katheryn J. Frost, Maria E. Fernandez-Gimenez, David W. Norton, and Daniel H. Rosenberg. Observations on the Workshop as a Means of Exchanging Traditional and Scientific Knowledge, 2001.

few telephone calls to the community constituting community involvement, to a project fully funded and run by a Tribe or Tribal organization. Even with community involvement at its fullest, however, the professional bias by EVOS scientists against local community research resulted in the close scrutiny of projects, including making site visits to the project prior to making funding recommendations for future years work.

In 2000 and 2001, the Trustee Council began working on the Gulf Ecosystem Monitoring program and the restoration projects began winding down. With this in mind, the focus of the community involvement project changed somewhat to include activities to meaningfully involve communities in the planning process for GEM, and limited funding was provided to support the village's efforts to develop their technical management capabilities and their Tribal Natural Resource Management Plans. While the restoration work was winding down, the Tribes continued to struggle for involvement in restoration projects. This became more difficult as funding for the Community Involvement Program continuously decreased. When the program was in full operation, each community was provided $20,000 annually to fund a Tribal staff person to facilitate their involvement in the EVOS related activities. Over the years, this funding decreased to $12,000 per community, then $9,000, then $6,000 for these services. Tribes oftentimes felt that this small amount of funding was an insult to the importance of their involvement and not worth the time they really felt should be spent on oil spill related issues. They felt their involvement was still as critical as it was when the spill occurred. The Trustee Council staff on the other hand, struggled with justifying a fully funded program while funding for other research projects was being decreased.

In a related issue, the amount of involvement by each community varied, so those who were actively involved received the same amount of funding as those who were minimally involved. Since the Trustee Council's goal was to advocate for community involvement, they politically could not reduce funding for the less involved Tribes or increase funding for those who were more involved, but continued to struggle with this issue throughout the program. The cultural difference in program analysis became clear the more this issue resurfaced. The Trustee Council staff, with their western values and methods of evaluation, expected to evaluate this program by utilizing numbers and numbers of objectives accomplished. In other words, they felt comfortable with measuring the success of the project by performing a quantitative analysis

while the Tribes felt that a qualitative analysis was more appropriate. The success of other science-based projects was measured by numbers of animals counted, for example. This project was funded to facilitate community involvement, which is very difficult to measure using numbers. Attempts to force this style of project management on the Tribes met with limited success. As an example, each Tribe was required to file a monthly narrative report detailing their activities related to the oil spill. The facilitators chosen for each community were those who actively hunted, fished, and gathered, oftentimes for many other members of the community. The concept of writing a narrative report was foreign, thus reports did not get submitted. The approach to this requirement was amended to offer the opportunity to provide an oral report that would be written up by the Community Involvement Coordinator. This too met with limited success. Finally, the reports were put into a form, where the facilitator would just have to fill in the blanks and were only to be submitted quarterly. This increased the number of reports being returned, but the program never reached a 100 percent return. This difference in analyzing the program made it difficult for CRRC (who was the grantee for the project) to justify continued funding at an adequate level to the Trustee Council staff, and likewise, lack of monthly reports or other ways to measure the success of the program made it difficult for the Trustee Council staff to justify the continuation of the program at its original level to the Trustee Council.

Tribal Natural Resource Management:

Tribes have been successfully practicing traditional resource stewardship techniques since time immemorial. Knowledge of population densities, critical habitat areas, harvest allocation, and harvest timing, as an example, have all been used by indigenous people to ensure the healthy continuity of their communities. Within the past 25 years, Tribes have taken this knowledge and enhanced it with western science in an effort to be active partners in the resource management decision-making process that affects those species and resources upon which they depend. In addition, the Tribes recognized that the state and federal agencies had limited financial resources to adequately address all resource management issues on public and private lands including those in their traditional use areas. Today, Tribes across the country are operating state-of-the art Tribal Natural Resource Programs with fully trained staff working in areas such as fisheries, wildlife, forestry, recreation and tourism, air quality, water quality,

conservation enforcement, marine resources, aquatic nuisance species, endangered species, and environmental protection. Many Tribes in the continental U.S. have developed co-management agreements with state and federal agencies to enhance the management effort of specific species.

Recognizing the need to become more actively involved in the management decision-making process, Tribes in Alaska, within the past 10 years, have been developing their natural resource programs as well. Many of them are being modeled after Tribal programs in the continental U.S. The effort began in the Chugach Region approximately 7 years ago. Today, there are five Tribal programs in the region, working with the Chugach Regional Resources Commission (CRRC), a Native nonprofit inter-Tribal fish and wildlife commission comprised of the seven member Tribes in the Chugach Region. CRRC also has on contract three professional biologists to assist with program development. Thus far, training has been provided on a limited basis through workshops and conferences hosted by CRRC, the Native American Fish & Wildlife Society, and the Alaska Inter-Tribal Council, as well as on-site technical assistance provided by CRRC biologists.

There are two major efforts currently underway to assist with capacity building and program development in the Chugach Region. First, the concept of establishing an Integrated Resource Management Planning process was introduced. The IRMP process defines the arena in which an assessment of proposed decisions and their related impacts are evaluated. It aides in the formulation of policies and priorities which land managers are to use to ensure their actions move federal, state, and Tribal entities toward a shared vision for the future. Through this process, critical natural resource management issues can be addressed with broad consistency, reducing conflicts between state and federal agencies and Alaska Tribal programs, while minimizing duplication of the federal and/or state management effort. In addition, funding from Tribal programs could be partnered with state and federal funding to enhance the management effort. In turn, Alaska Tribes are enhancing their own capacity to satisfy independent program goals and develop a more meaningful cooperative relationship with federal (and state) management agencies. The goal of integrated resource management is to tie all decisions that affect a tract of land or marine resource area together so that each decision's impact is weighed against all others.

Meetings with the Tribal Chiefs/Presidents of the region regarding this process resulted in the directive to develop Tribal Natural Resource Management Plans for each community. CRRC has worked with each community separately to identify their priority issues, priority species, and critical habitat and harvest areas. Three of the plans are complete so far, and are awaiting final Village Council approval.

Second, CRRC is working with the village chiefs/presidents of its member Tribes to develop a region-wide integrated resource management plan. This plan will identify traditional harvest areas, critical species habitat areas, and other areas in the Chugach Region of cultural importance. This plan will also serve as a management tool for Tribes who hunt, fish, and gather in common areas to cooperatively address resource issues of concern. In addition, the plan will include separate goals and action plans for critical subsistence species. It is anticipated that this region-wide integrated resource management plan will be the main source of information when working with the Trustee Council and its GEM program. We are hopeful that the need for and application of this information will be thoughtfully considered by the Trustee Council office when developing their annual research and monitoring plans under GEM.

Tribes are eager to become more integrally involved in the management of the resources upon which they depend. They also realize, however, that they lack the technical training necessary to carry out many of the biological research projects they are interested in pursuing. Instituting a technical training and education program for Tribal natural resource management would provide the Tribes with the tools of western science to aid in the restoration process. Partnered with the traditional ecological knowledge currently held by the Tribes, the western scientific knowledge would provide the Tribes with the credibility required to gain respect by the state and federal management agency personnel. This, in turn, would allow the Tribes to take their rightful place at the management table and provide them with a belief that they are contributing in a meaningful way to the restoration and monitoring of the resources in their traditional use areas.

GEM and Meaningful Community Involvement:

We believe that the Tribes residing in the areas affected by the Exxon Valdez oil spill have the biggest stake in the outcome and ultimate success of the overall GEM goal . . . sound

stewardship of the Gulf Ecosystem. The success of the GEM program depends upon a commitment by all parties to Meaningful Community Involvement. A well-established connection to the resource users, particularly the Tribes, is the key to the most successful research and monitoring program. Resource users will ultimately determine the fate of the subsistence resources, given a quality environment, and to disenfranchise them from the management responsibility is a recipe for disaster.

In an effort to ensure the involvement of the Tribes in the development and implementation of the Gulf Ecosystem Monitoring Program, the Chugach Regional Resources Commission underwent an extensive process by which they solicited comments and opinions from the local grassroots people living in the oil spill area, including those in Kodiak and the Alaska Peninsula. The CRRC staff then worked with the CRRC Board of Directors and their member village councils to compile these comments into a position paper for submission to the EVOS Trustee Council[8]. This paper was developed and submitted to the Trustee Council in 1998.

Basically, this position paper supported scientific research and monitoring of the natural resources on a continuous long-term basis. In conjunction with research and monitoring, the Tribes felt that a long-term management plan must be developed as a guide for restoring the resources injured by the oil spill. Furthermore, Tribes in the oil spill affected region felt they must play a key role in these activities in order for these programs to be effective. The Tribes stated that the local Native residents in the communities are the most knowledgeable about the resources in their respective areas, and as such are the most qualified to make management decisions regarding those resources. Working on a government-to-government basis with the Tribes and state and federal management agencies, the land and resources acquired under the habitat acquisition program as well as those currently held by the Tribes and Native corporations will be protected, preserved, and managed in a manner that is beneficial to all users.

The Tribes supported the funding of scholarships and internships for spill area residents in the sciences, environment, and natural resources fields to allow the local residents to become

[3] Brown-Schwalenberg, Patricia, Position Paper on the Proposed Uses of the *Exxon Valdez* Oil Spill Trustee Council Restoration Reserve, April, 1998.

educated in western science. They felt this would enhance their knowledge of the ecosystem and provide opportunities for them to become leaders in restoration. Programs such as this would also encourage the young people to pursue educational opportunities and possibly degrees in the natural science fields.

Finally, and key to the Tribal involvement in the whole restoration process, is the concept of establishing an endowment of $20 million for a Tribal Community Fund for the Tribes in the oil spill affected area. The Tribes believe that community based research and monitoring projects and some level of technical training and assistance provided at the local level through a Tribal Community Fund would enhance the restoration effort while providing them a meaningful role in the research and monitoring efforts occurring under the GEM program. Tribal and community participation is based upon availability of adequate funding to support this participation, just as agency participation is equally dependent on funding.

The Tribal Community Fund:

The existence of a set-aside for Tribes in the form of a Tribal Community Fund would provide several methods to address meaningful community involvement. Looking at the current situation, the Tribes feel that we can all take a few lessons from this learning experience. For example, under the current structure, the Tribes feel they are not receiving a fair and unbiased review by the Peer Review Group, a panel of five scientists who review the proposals and make funding recommendations to the EVOS Trustee Council Executive Director, who in turn seeks approval for these recommendations from the EVOS Trustee Council. There is no advocate on this panel for the proposals submitted by the Tribes. In addition, although the Tribes are capable of conceiving sound research and monitoring ideas, the nature of the proposal mechanism is one with which they are unfamiliar and it becomes difficult for many to write a convincing proposal. Therefore, many of the Tribally determined projects do not get funded. Competing for funds among only Tribes and Tribal organizations through the Tribal Community Fund would encourage increased participation from the local Native communities and provide hope that their project ideas will be funded. This in no way means a lowering of the standards for the Tribal

projects. We are committed to conducting sound projects with good, sound science. The Tribal Community Fund will give the Tribes the means to address issues within the GEM scope that the Tribes see as being top priority. The Tribal perspective is different than those of the EVOS researchers and they, as resident resource users, are interested in particular species and issues.

It should be noted that GEM is a 100-year program, so the opportunity exists now to include Tribes into a good comprehensive research and monitoring program. Under the current Community Involvement Program, funding was based on annual short term objectives. Instead of spending time and funding accomplishing this series of short term objectives, we should have been developing and implementing a long term training program that would teach the Tribes the language and intent of science and in conducting certified technical on-the-job training in natural resource related projects. If this had occurred, the Tribes would be better prepared able to attend the annual restoration workshops and participate in a meaningful way.

The Tribal Community Fund will provide long-term base funding for Tribal traditional natural resource management programs. The Tribes underwent a period of shock after the oil spill, and 8-10 years later were just starting to recover and take proactive steps to assist in the restoration effort. Meaningful involvement by the Tribes under a co-management regime would facilitate the healing process. The Tribal Community Fund would provide the finances for such involvement through the perpetual funding of Tribal traditional natural resource management programs in each of the communities. Tribes would be funded on an individual needs basis, based on short, medium, or long term objectives submitted by each Tribe in a proposal format under the EVOS proposal process, but they would compete only amongst themselves within this endowment for the amount of funding available on an annual basis (estimated at $1.5 million).

Many of the Tribes operate under P.L. 93-638 contracts or compacts either individually or through their regional nonprofit corporation. This funding mechanism, exercised by the Bureau of Indian Affairs, turns the responsibility of funding allocations over to the Tribes. The Tribes are then responsible for allocating their BIA funds into whatever programs best address their Tribal community needs. This requires a certain amount of prioritization. When Tribal natural resource programs are competing for funds with necessary social programs such as employment and training, education, health, Indian child welfare, and elder nutrition, as an example, the natural resource programs quite frequently are placed near the bottom of the

priority list. This situation is no different than what occurs within the state and federal legislative system, where tough decisions are made about state and federal funding appropriations. In Alaska, the BIA budget for fish, wildlife and parks is minimal compared to the budget for Tribes in the rest of the country. Whereas Alaska Tribes and Native corporations hold title to over 45 million of acres of land, their share of the BIA budget is a mere $2-3 million annually. To put this in perspective, the entire national BIA budget for Tribal natural resource programs is approximately $45 million and serves less than 10 million acres of Tribal lands in the Lower 48 states. In addition, other funding sources, such as private philanthropic foundations or state and federal funding programs do not fund long term operation of Tribal natural resource programs. The Tribal Community Fund appears to be the best solution to this long term funding dilemma. An added benefit is that this base funding could be used as matching funds when pursuing other funding opportunities, thereby doubling or even tripling the Tribal natural resource management program budget in many instances.

The Alutiiq people in the oil spill impacted area depend upon the fish, birds, shellfish, marine mammals, and other resources injured by the oil spill for their livelihood and culture. The *Exxon Valdez* oil spill reduced or temporarily eliminated many of these important resources, threatening the traditional Alutiiq way of life. Unfortunately, because of limitations stated in the agreement between the Exxon Corporation and the state and federal governments, settlement expenditures can only be used to restore, replace, enhance, or acquire natural resources directly affected by the oil spill, excluding the spiritual and physical affects to the Tribal people. Ironically, the human element of the oil spill cannot be addressed with EVOS funds. The establishment of a Tribal Community Fund would provide an avenue to finally move toward healthy communities taking an active role in the restoration of their natural resources. The direct participation in the projects funded under the Tribal Community Fund would provide employment, education, self-confidence, pride and cultural awareness – all key ingredients in protecting the health and social well-being of the people most impacted by the oil spill.

Structure of the Tribal Community Fund:

The concept proposed here for the structure of the Tribal Community Fund is a "best case" scenario. The Tribes realize that politically and possibly legislatively, this scenario will be

difficult to achieve, but nevertheless, they firmly believe that this concept is the best method to involve the Tribes in a meaningful way, while still providing a certain amount of oversight by the Trustee Council.

The current funding mechanism of the Trustee Council is that any funding must go through one of the Trustee agencies. In order for the Tribes or Tribal organizations to become a grantee, they must deal with two levels of bureaucracy (in addition to their own Tribal administrative structure) in order to get their funding. In addition, each agency that the funding passes through gets a certain amount of money for administration, which is generally calculated at a high rate. This needlessly reduces the amount of funding available for actual project costs.

The Tribes, therefore, are proposing that the Chugach Regional Resources be designated to manage and administer the $20 million fund. The funding would go directly to the Chugach Regional Resources Commission, who will be responsible for working with the EVOS Trustee Council in facilitating the proposal process, administering the fund, and working with the grantees, once the funds are awarded.

The Tribal Community Fund would be governed by a board comprised of nine Tribally elected representatives from the oil spill area, one federal agency representative, and one state agency representative. This board would be tasked with setting policy, providing guidance, and making the final funding decisions on project proposals submitted to them. The make-up of the board would ensure that the state and federal agency interests are addressed, the Trustee Council would be assured that the foundation would be operating within the goals and mission of the Trustee Council, and most importantly, Tribes would have a voice in the projects that affect their traditional use areas.

Requests for proposals (RFPs) would be sent out by the Exxon Valdez Oil Spill Trustee Council as part of their formal RFP packet they normally distribute. There would be a separate funding category for Tribal projects. This funding category would be for issues of key significance to the Tribes. Part of the application would include a box to check indicating which

program an applicant is apply under . . . general restoration, research and monitoring, or Tribal projects. Only Tribes and/or Tribal organizations would be eligible to apply under the Tribal Projects designation; however, this does not preclude them from applying for funding under the other funding categories nor does it preclude researchers from cooperatively submitting proposals under any category. All proposals received by the Trustee Council would be logged in and those designated as Tribal Projects would be forwarded to the Chugach Regional Resources Commission's foundation for a separate review process. Tribal Projects would be divided into two subcategories: 1) GEM research and restoration, and 2) Tribal natural resource training and education and program development

A Tribal GEM Steering Committee would be developed comprised of scientists and Tribal natural resource personnel. They would be tasked with reviewing each proposal within the context of GEM and prioritize them based upon how well they fit within the GEM goals. The Steering Committee would also be responsible for providing technical assistance to those Tribes or organizations who wish to submit project proposals or to improve those proposals for resubmission that were not funded the previous year. Once the proposals are reviewed by the Tribal GEM Steering Committee, they would be returned to the Trustee Council for inclusion in the normal peer review process for an advisory scientific review. Comments from the EVOS peer review group on Tribal Projects would then be forwarded back to the Tribal GEM Steering Committee for action. This Tribally approved list of proposals would then be submitted to the EVOS Trustee Council for final approval. The proposals would be recommended for funding based upon the following criteria:

1. scientific merit;
2 how the proposed project fits within the GEM plan;
3. how the proposed project fits into the long range goals of the community and it's natural resource program;
   how the proposed project will integrate Traditional Ecological Knowledge into the project objectives
4. how the proposed project will facilitate meaningful involvement by the community members;

5. how the results of the proposed project will benefit the resources or people affected by the project;
6. matching funding availability.

The Tribes with successful project proposals would then undergo a short training session on managing the grant funds, conducted by CRRC staff. Since this is a new program, this training would clarify the roles of the parties involved, outline the fiscal and narrative reporting requirements of the grantee, and answer any questions regarding the grant process. Upon request, the technical staff of the Chugach Regional Resource Commission would be available to assist the communities with conducting the actual project once it was funded and assist with reporting requirements as needed.

In order to provide for funds into perpetuity, this $20 million would have to be set up as an endowment. Given this scenario and the allowance for administration and inflation proofing, a fund of $20 million could generate an annual budget of between $1 and $1.5 million. Of this amount, funding would be available to each Tribe for building their technical capacity to become more meaningfully involved in the GEM Program, and to further develop their Tribal traditional natural resource programs, as well as conducting scientific research and monitoring within the scope of GEM.

Conclusion:

The Tribal stewardship goals are to have a healthy ecosystem and to understand the ecosystem so that Tribes can play an effective role in conserving the subsistence species and environment that they depend upon. Our very existence depends upon maintaining a sustainable environment with a diversity of resources that we can depend upon into perpetuity. We feel these goals are fundamentally compatible with the Gulf Ecosystem Monitoring Program. But, more importantly, are fundamental human rights that are guaranteed to Indigenous People.

The establishment of a Tribal Community Fund, set up as an endowment, would provide into perpetuity the opportunity for oil spill affected communities to protect and preserve their

natural resources, work directly with state and federal agencies, throughout the spill area as Tribal traditional natural resource stewardship programs. This endowment would also provide the opportunity to protect the cultural and traditional diversity of the Alutiiq people through the funding of culturally- and Tribally-based scientific programs that are consistent with the GEM goals. Further, the Tribes are entitled to develop their technical management capabilities, capacity, and infrastructure to manage the natural resources upon which they depend, and to conduct culturally appropriate science-based projects based upon the damage that was done to their traditional use areas and spiritually based traditional lifestyles. Developing cooperative programs between the Tribes and the research community similar to existing co-management groups is a must if this program is to be successful. However, this cannot be accomplished without long term and continuous funding.

For Tribes devastated by the oil spill and still working their way through the aftermath, establishing Tribal natural resource programs is one way to reassert their role as stewards of the environment and resources on which they depend, culturally, spiritually, and physically. The Tribal commitment to long-term stewardship is unparalleled, but their ability to put that commitment into practice depends on establishing sound programs run by trained personnel. This will not happen by accident or by wishing them into existence, and it will not happen overnight. It requires stable funding and patience to achieve goals that will take several years to realize. The Tribal Community Fund will provide the opportunity the Tribes need to make a substantial contribution not just to their own future, but to the future of all who care about the Northern Gulf of Alaska.

As stated previously, GEM is a 100-year program. Even after 100 years, the Tribes will still exist as part of the ecosystem and will continue to lead active subsistence lifestyles in the area affected by the Exxon Valdez oil spill. The Tribes, therefore, are the obvious choice to be the stewards of this ecosystem into perpetuity.

Chugach Regional Resources Commission

Chenega Bay

Eyak

Nanwalek

Port Graham

Qutekcak Native Tribe

Tatitlek

Valdez Native Tribe

June 10, 2002

Molly McCammon, Executive Director
Exxon Valdez Oil Spill (EVOS) Trustee Council
441 West 5th Avenue, Suite 500
Anchorage, Alaska 99501

Dear Molly,

On behalf of the federally recognized member Tribes of the Chugach Regional Resources Commission, we would like to invite the Trustee Council to meet with the Tribes affected by the Exxon Valdez Oil Spill to develop an Alaska Tribal Government Policy that would specifically address Tribal involvement in matters relating to the Exxon Valdez Oil Spill and would confirm that the Trustee Council is committed to working with the Tribes on a government-to-government basis. This meeting would also provide the opportunity to clarify the role of a sovereign, federally recognized Tribe, and how that status differs from "community" or "public." We believe a policy such as this would serve to formalize such a relationship between the Tribes and the Trustee Council, thereby providing a foundation for more meaningful community involvement in the GEM program.

Since the establishment of the EVOS Trustee Council, a few significant events have taken place:

1. In 1995, Ada Deer, Assistant Secretary of Indian Affairs, DOI, officially declared a federally recognized Tribal status for Tribes in Alaska including Chenega IRA Council, Native Village of Eyak, Tatitlek Village IRA Council, Port Graham Village Council, Nanwalek IRA Council, Seldovia Village Tribe, Native Village of Port Lions, Ouzinkie Tribal Council, Old Harbor Tribal Council, Native Village of Akhiok, Karluk IRA Tribal Council, Larsen Bay IRA Council, Native Village of Chignik Lagoon, Chignik Lake Village Council, Native Village of Chignik, Native Village of Perryville, and Ivanof Bay IRA Council. These are all Tribes affected by the Exxon Valdez Oil Spill of 1989.
2. Presidential Executive Order 13175 (replacing E.O. 13084, May 14, 1998), Consultation and Coordination with Indian Tribal Governments,

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was signed on November 6, 2000. This Order declares that federal agencies have a fiduciary and trust obligation to "... establish regular and meaningful consultation and coordination with tribal officials in the development of federal policies that have tribal implications, to strengthen the United States' government-to-government relationships with Indian Tribes, and to reduce the imposition of unfunded mandates upon Indian tribes;...".

3. The Millennium Agreement was recently signed by Alaska Tribes and the Governor of Alaska, with the following purpose - "Purpose: confirms the commitment by the State of Alaska and Tribes to overcome impediments to a more constructive dialogue and to implement government-to-government relationships".
4. The Indigenous Peoples Subcommittee of the National Environmental Justice Advisory Council adopted a document in May, 2000, entitled "Consultation and Collaboration with Indian Tribal Governments And The Public Participation of Indigenous Groups and Tribal Citizens." This document outlines strategies by which Tribal, state, and federal governments can work together on an equal basis.
5. The Oil Pollution Act, passed in 1994, establishes the inclusion of Tribal Government involvement in any future oil spills. While this Act does not specifically apply to the EVOS Trustee Council, we believe that it would be beneficial for all parties involved to use the language under Section 2706 Natural Resources as a guide for developing future collaborative partnerships between the Tribes and the Trustee Council.

In accordance with these events, each federal agency represented on the Trustee Council has either a signed or draft Tribal Consultation Policy, as should the State agencies.

We are respectfully requesting that you place this issue on the agenda for the next EVOS Trustee Council meeting. There will be several Tribal representatives present, so they will be available to answer any questions the Trustees may have regarding this issue. Thank you in advance for your consideration of this request. We look forward to your response.

Best regards,

Patty Brown-Schwalenberg
Executive Director

ALASKA INTER-TRIBAL COUNCIL
Resolution No. 96-19

REQUESTING AN OFFICIAL TRIBAL GOVERNMENT REPRESENTATION ON THE EXXON VALDEZ OIL SPILL BOARD OF TRUSTEES

WHEREAS, a $900 million fund was set up as a result of the 1989 Exxon Valdez oil spill to address the problems of injured and diminished natural resources and to institute a restoration program to aid in this process; and

WHEREAS, the Alaska Native villages in the oil spill impacted region have suffered a tremendous loss in subsistence resources, cultural ties with the land, increased social ills due to the devastation of the oil spill, and loss of cultural values provided by gathering, preparing, and sharing of food; and

WHEREAS, the Exxon Valdez Oil Spill Board of Trustees was established to address these and other issues directly related to restoration of the resources and is comprised of federal and state government representatives; and

WHEREAS, the Exxon Valdez Oil Spill Board of Trustees has provided minimal support to the Native village and has allowed minimal support to the Native villages and has allowed minimal participation by Native governments in the restoration and decision making process; local residents have voiced concern over the lack of involvement by spill area communities in the restoration efforts; and

WHEREAS, it has been determined by a steering committee made up of representatives from Native villages in the oil spill impacted region that in order for Alaska Natives to be more integrally involved and have a meaningful role in restoration process, an Alaska Native representative must be appointed and allowed to represent the tribal governments a voting member of the Exxon Valdez Oil Spill Board of Trustees.

NOW THEREFORE BE IT RESOLVED that the delegates to the 1996 Annual Convention of the Alaska Inter-Tribal Council, urge U.S. Congress to appoint a Tribal Government representative as the third governmental entity on the Board to represent the interests of the Alaska Natives; and

BE IT FURTHER RESOLVED that the Alaska Inter-Tribal Council supports the Tribal Governments of selecting their representative.

CERTIFICATION

We, the undersigned hereby certify that this resolution was duly passed by the AI-TC Board on December 3, 1996 at Anchorage, Alaska and a quorum was duly established.

AI-TC Chairman

AI-TC Executive Director

Submitted by: Native Village of Eyak

DRAFT ATTORNEY CLIENT CONFIDENTIAL

February 12, 1997

Deborah L. Williams
Special Assistant to the Secretary for Alaska
United States Department of Interior
1689 C Street, Suite 100
Anchorage, AK 99501-5151

Dear Deborah:

We reviewed the Alaska Inter-tribal Council resolution 96-19 which you faxed to me. The resolution requests that a tribal representative be placed on the *Exxon Valdez* Oil Spill Board of Trustees. The resolution requests the U.S. Congress to make such an appointment.

The request for tribal representation raises a couple of issues. First of all, can a Native representative be appointed as a Trustee for the Exxon Valdez oil spill trust fund ("Trust Fund") under current state and federal law. Second, should there be Native representation on the Trustees.

On the first point, I understand that the August 28, 1991 Memorandum of Agreement and Consent Decree ("MOA"), reflecting state and federal law, provides for state and federal "officials" to be trustees for the Trust Fund. Appointing a person to be a trustee who is not a state or federal official would probably require changes to the MOA, federal law and, potentially, state law. Also, it is my understanding that the existing structure of three state and three federal trustees was set up in a court order through the MOA and can be changed only by mutual agreement to amend that decree and the approval of the court. I am not sure that Congress has such authority, but I assume the Department of Interior's lawyers might have a view on that.

As to the second point, I am not sure that either the federal government or the state government wish to amend the agreement to add a seventh, non-governmental, member to the Trustees. In addition to the potential legal problems, to do so might raise a variety of other requests for membership from organizations such as municipal governments, environmental groups, business groups, the university or other organizations which might have a direct interest in the *Exxon Valdez* Trust Funds.

If we do not wish to expand the membership, and if Native tribal government representation is desired, then of course the only other option is for either the state or federal government to designate one of their seats to the Native community. The state may not do so under existing state law nor do we believe it is appropriate. On the other hand, it seems logical that the federal government would use one of their seats to provide for such representation, as tribal governments have a government to government relationship with the federal government and, should you desire, we are willing to discuss with you ways in which this can be accomplished.

In conclusion, although I can clearly understand the desire of the tribal governments to sit as a Trustee, the state does not have the legal authority to either change the current three seat apiece designation of seats by the state and federal governments or to give up one of our seats to Native interests. Further, we do not believe that it is appropriate to do so. If the federal government would like to use one of their seats for such representatives, and if appropriate changes to the court order and federal law are made, the state would be fully in support of that decision.

I would be pleased to discuss this with you further.

Sincerely yours,

Jim Ayers

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EVOS Tribal and Community Involvement

The purpose of this report is to provide background for a discussion of how to incorporate tribal and community involvement in the Gulf Ecosystem Monitoring (GEM) program.

Our Commitment

Since its inception, the *Exxon Valdez* Oil Spill Trustee Council has been committed to public participation and local community involvement in all aspects of the restoration program. The Trustee Council recognizes the tremendous loss of livelihood and cultural heritage caused by the 1989 oil spill and has devoted a major portion of the restoration funds to the restoration of natural and archaeological resources that are important culturally and economically. This effort has included significant public and community involvement and outreach. As the GEM program develops, the Trustee Council hopes to expand community involvement, use of local and traditional knowledge, public participation, education, and outreach. These will be major components of the Trustee Council's long-term effort to restore and better understand the northern Gulf ecosystem.

As an organization, the Trustee Council is committed to having community members actively involved in:

- Planning and developing the program
- Guiding the goals and topics of research projects
- Collecting data and participating in long-term monitoring efforts
- Providing Traditional Ecological Knowledge
- Interpreting results in a local context
- Educating other community members about ongoing research

Some of this involvement will come in the form of participation in various planning and review committees. Other involvement will be in the form of working with scientists to provide quality data and input into the GEM program. Portions of GEM monitoring will rely on citizen volunteers based on successful programs throughout North America. Requests for proposals will ask proposers to state how communities will be involved and informed about each project. Funds for community involvement and/or TEK components will be provided.

The remainder of this report documents the efforts and actions the Trustee Council has taken to date to involve tribes, communities, stakeholders and the general public.

A. Community Involvement Project

From 1995-2001, the Trustee Council has provided almost $2 million to the Chugach Regional Resources Commission (CRRC) to hire a community facilitator in each of ten spill area communities as well as a region-wide community involvement coordinator. CRRC is a regional organization of several tribal governments in the Chugach region, including Prince William Sound and lower Cook Inlet. Facilitators typically have been employees of the tribal government in each community. The communities included Chenega Bay, Tatitlek, Valdez, Cordova, Port Graham, Nanwalek, Seldovia, Ouzinkie, Seward, and Chignik Lake. The facilitators had five major purposes:

1. **Provide results of oil spill restoration projects to the communities.** Facilitators were paid to disseminate twice-monthly updates provided by the Community Involvement Coordinator about the restoration effort to members of their local communities. They would also attend the Trustee Council's Annual Restoration Workshops where they could talk directly to scientists and obtain answers to their questions in a manner they could understand and share when they returned to their communities.
2. **Facilitate communication between local communities and the Trustee Council.** The project was designed to provide for regular communication between communities, facilitators, and the Trustee Council. Each month, the facilitators were to meet with members of their community to request opinions, ideas for restoration projects, and concerns and then submit a monthly report to the Community Involvement Coordinator who would pass the information on to the Trustee Council. Facilitators also participated in retreats and workshops to evaluate the program and provide feedback to the Trustee Council.
3. **Promote community-based projects and involvement throughout the life of the restoration effort.** Facilitators worked with the Community Involvement Coordinator and EVOS staff to help spill area communities develop competitive proposals for projects of interest to local community members. Many of these projects are described below.
4. **Serve as primary contact for EVOS in the Community.** Requests for information, assistance, and input were all filtered through the facilitator who served as key contact person. Principal investigators were urged to use them as their village contact.
5. **Provide tribal input into development of GEM.** Facilitators have been regularly briefed on the status of GEM planning and consulted about their priorities. The project has helped fund development of natural resource management plans in several villages, with an eye towards seeing that these local plans and the GEM plan are complementary.

B. Integrating Traditional Ecological Knowledge (TEK)

In 1994, the Trustee Council received its first call from a community resident to incorporate Traditional Ecological Knowledge (TEK) of spill area residents into the restoration program. Two years later, the 1996 annual restoration workshop had TEK as its theme and led to a set of protocols for incorporating TEK into restoration projects developed by a committee of Alaska Natives and others and approved later that year by the Trustee Council. The Trustee Council has provided funds each year since 1995 toward the goal of incorporating TEK into the restoration program. Efforts have included:

1. Developing a TEK handbook and reference guide for biologists documenting the sources of TEK in the spill area and incorporating it into a western science approach.
2. Providing funds for CRRC to contract with TEK expert Henry Huntington. He has worked directly with Alaska Native elders and hunters as well as scientists to bridge the gap between these two different approaches to understanding the natural world. A result of this process is that several EVOS projects incorporate TEK directly into their data sets and results, including projects on community natural resource management, fish and seabird studies, and a series of films about Alutiiq culture (see examples below).
3. Conducting two workshops to develop tribal management programs and bringing several scientists to spill area communities to share information.

Examples of projects incorporating TEK as a result of Trustee Council efforts include:

1. Researcher Jody Seitz conducted an extensive project involving Traditional Ecological Knowledge. Researchers interviewed thirty-nine spill area community members to document the historical distribution of forage fish such as juvenile herring, sandlance, capelin, and eulachon. This information was mapped and provided to the Alaska Predator Ecosystem Experiment (APEX) and Sound Ecosystem Assessment (SEA) researchers. The results were extremely valuable because they could not have been obtained from other historical sources or from current data collection efforts.
2. Scientist Dan Rosenberg solicited local participation from communities and conveyed results of his research on surf scoters, an important subsistence resource. The project idea came from local communities. Rosenberg worked with them throughout all stages of the project, from project design to writing the final report.
3. The Trustee Council provided funding support to the Alaska Native Harbor Seal Commission, which uses Alaska Native hunters to conduct biosampling of harbor seal tissues using lab-approved techniques. In 1999, the commission reached an agreement with the National Marine Fisheries Service to co-manage harbor seal populations.
4. Three videos have been produced with Trustee Council funds to provide the public information about Traditional Ecological Knowledge and concerns about subsistence use after the oil spill. The first two, *Alutiiq Pride: A Story of Subsistence* and *Changing Tides in Tatitlek* describe subsistence methods, interview Alaska Native people who experienced the spill first hand, show actual subsistence hunts, and illustrate the importance of subsistence in Alutiiq culture. The third documents the communities of Chenega Bay and Ouzinkie in relation to the effects of the oil spill, residual oil in the spill region, and concerns about PSP, a natural toxin found in clams harvested for food. These videos were distributed at no charge to all schools in Alaska via their school districts, all spill area tribal councils, and any other library or school in the U.S. upon request.
5. The Trustee Council funded Elders/Youth Conferences in 1995 and 1998 that brought together Alaska Native elders, youth, other subsistence users, scientists, and managers to share ideas about subsistence issues and facilitate community involvement. The Trustee Council paid for four people from each of 20 spill area communities to attend each conference. Participants shared stories, voiced frustration, and asked scientists questions about subsistence issues. They also developed ideas for youth to get more involved through spirit camps, internships, and educational opportunities. These workshops facilitated collaboration between communities of the spill area, while concerns and ideas generated at the conference were reported to the Trustee Council.

C. Use of Criminal Settlement funds on subsistence projects

A total of $6,219,611 from the criminal settlement with Exxon, Inc. was appropriated to the Alaska Department of Community and Economic Development (DCED) to implement a grant program with the purpose of restoring, replacing, or enhancing subsistence resources or other services damaged or lost as a result of the *Exxon Valdez* oil spill. The grants were limited to the nine non-incorporated communities of Tatitlek, Chenega Bay, Port Graham, Nanwalek, Karluk, Chignik Lake, Chignik Lagoon, Perryville, and Ivanof Bay. The three Alaska state representatives on the Trustee Council must be consulted before grants are awarded. As community involvement and subsistence projects were proposed to the Trustee Council, those that could not be funded through the civil settlement were passed to this grant program, which

was not as legally constrained in its scope of fundable projects. The Trustee Council funded the planning process that preceded the grant awards and provided peer review for all proposals under this program. The planning process included sending a team to visit all 9 communities to brief them about the program and assist them identifying and prioritizing potential projects. To date, the state representatives of the Trustee Council have approved 24 projects. These projects include:

- Spirit camps in Prince William Sound and Kodiak Island
- Mariculture, hatchery, and processing facilities for the villages of Tatitlek, Chenega Bay, Chignik Lake, Chignik Lagoon, Perryville, and Ivanof Bay.
- Salmon enhancement projects on major subsistence runs near Nanwalek and Port Graham, and on the Kametolook River
- A weir project on the Chignik River
- A subsistence management education program in Tatitlek
- Cultural education centers and programs in Chignik Lagoon, Chignik Lake, Ivanoff Bay, and Perryville
- A preschool language program in Nanwalek
- Community smoke houses in Karluk
- A floating skiff dock in Port Graham
- Archaeological display equipment in Chignik Lake
- A "Subsistence, Stewardship, and Oil Spill Recovery Gathering" in Tatitlek

D. Youth Area Watch

In 1995, the Trustee Council launched the Youth Area Watch (YAW) program with the objective of involving youth from spill area communities in the science behind the restoration effort. Under the direction of the Chugach School District and Kodiak Island Borough School District, teachers are trained annually at the Alaska Sealife Center or Kodiak College. Students have participated in YAW from Cordova, Tatitlek, Valdez, Whittier, Chenega Bay, Seward, Nanwalek, Port Graham, Seldovia, Akhiok, Larsen Bay, Old Harbor, Port Lions, Kodiak City, Karluk, Chiniak and Port Lions. These students (grades 7-12) work with scientists on oil spill research both in the field and in the laboratory. Projects in which students have participated include:

- Harbor seal biosampling
- Seabird monitoring
- Identifying and photographing killer whales
- Analyzing chemicals found in intertidal mussels
- Collecting oceanographic data on cruises
- Sampling juvenile herring in Prince William Sound

In addition to assisting scientists, YAW students develop local restoration projects of their own that directly benefit their communities. Examples of these projects include:

- Black-legged kittiwake monitoring
- Constructing seal and orca skeletons for museum display
- Constructing a community greenhouse
- Teaching about composting
- Constructing a retrievable marine habitat in the community harbor

The program has also aligned itself with a major oceanographic study called the SALMON project through the University of Alaska, Fairbanks. YAW students compare oceanographic forecasts and predictions with their own observations in the field to help scientists refine their computer models. Teachers also provide local knowledge about climate change in the marine environment.

As of 2002, 168 students have participated in the Prince William Sound and Kodiak YAW programs with total funding from the Trustee Council of over $885,000.

E. Other Restoration Projects

The Trustee Council has made a concerted effort to involve local communities affected by the oil spill in the restoration program. Projects funded include habitat enhancements of interest to sport and commercial fishermen, restoration of subsistence resources, food safety testing, and public outreach and participation. Here are some highlights that have resulted from the Trustee Council's effort to incorporate meaningful public participation and community involvement into the restoration program:

- Chenega residents worked with the National Marine Fisheries Service to clean up 12 local mussel beds.
- Local community members helped on a project to clean the Chenega area shoreline from residual *Exxon Valdez* oil on five cobble-boulder armored beaches.
- Alaska Native community members were paid to help NOAA conduct an extensive survey of lingering oil in Prince William Sound. Communities identified sites important to them that they wanted evaluated for residual oil and participated in the survey work itself.
- Waste management projects were funded in lower Cook Inlet, Kodiak Island, and Prince William Sound to address marine pollution in proximity to local communities and make improvements in local waste management infrastructure.
- The Trustee Council funded a project to restore coho salmon runs, producing 2,000 to 3,000 adults for harvest in a subsistence fishery near Tatitlek.
- With funding support from the Trustee Council, the Qutekcak hatchery in Seward produced over 800,000 clams during each year of a pilot project to seed clam beds for subsistence use near Port Graham, Nanwalek, and Tatitlek.
- The Trustee Council contributed partial funding to rebuild the Port Graham salmon hatchery that was destroyed by fire in 1998. The hatchery provides pink, sockeye, and coho salmon for the benefit of subsistence and commercial fishermen.
- The Trustee Council funded a project initiated by locals in the Native Village of Perryville to rebuild a declining coho salmon run on the Kametolook River used for subsistence.
- The Trustee Council funded a project initiated by the Valdez Native Tribe in conjunction with NMFS to provide information on spot shrimp abundance for subsistence users in Prince William Sound.
- The Trustee Council funded restoration and recreation enhancements along several miles of the Kenai River. These included access stairs, floating docks, interpretive displays, and streambank restoration for the benefit of sportfishing and tourism.
- The Trustee Council funded an assessment and restoration plan for Mariner Park in Homer, which promoted recreationally compatible use of the area by residents and tourists.
- Construction of the Alutiiq Archaeological Repository in Kodiak was funded to protect archaeological resources and educate the public about Alutiiq culture. In addition, the Trustee Council provided funding to train volunteers to monitor and act as site stewards of

archaeological sites on the Kenai Peninsula, Kachemak Bay, Uganik Bay, Uyak Bay, and the Chignik area of the Alaska Peninsula.

- The Trustee Council provided grant funds to Chugachmiut, Inc. to develop a regional archaeological repository in Seward, local display facilities in Chenega Bay, Tatitlek, Cordova, Valdez, Port Graham, Nanwalek, and Seldovia, and traveling exhibits.
- The Trustee Council funded the Port Graham Corporation to restore some salmon streams near the village of Port Graham.
- The Resource Abnormalities Study trained 61 volunteers in 19 spill area communities to take samples of abnormal animals harvested for subsistence. Samples were tested for hydrocarbons and human health effects at the National Marine Fisheries Service laboratory in Seattle. A Resource Abnormalities Hotline was established and the project communicated information on subsistence food safety to communities.

F. Annual Restoration Workshops

Every year in January, the Trustee Council holds its annual workshop free to the public, where EVOS scientists report their findings and future research directions are discussed. The Trustee Council pays to bring all its researchers as well as representatives from each community to the meetings. Each year's workshop has a different theme and in 1996, the theme was community involvement. Input received at these workshops is invaluable, and many research topics and priorities are developed as a result. For the 10th anniversary of the oil spill, the Trustee Council released a report to the nation and a documentary about the first ten years of oil spill effects and restoration.

G. Public Information and Outreach

The Trustee Council has produced numerous publications that inform the public about the status of injured resources, what the Trustee Council does with its funding, and other EVOS-related issues and activities. Except as noted, all documents are sent to a mailing list of over 3,000 and their availability is noticed in papers throughout the spill region. Publications can also be requested from the Anchorage Restoration Office, and many can be downloaded from the Web site. Public information and outreach efforts include:

- Annual Status Reports document major projects and land purchases as well as results of the restoration program explained in lay terms. These reports include an accounting of expenditures from the Trust Fund.
- The Restoration Notebook series contains detailed natural history and recovery information written by biologists about eight specific species injured by the spill and one about the damage, recovery, and status of subsistence resources. This series was distributed at no charge to all schools in Alaska via their school districts, all spill area tribal councils, and any other library or school in the U.S. upon request.
- Since 1993, the Trustee Council has regularly published Restoration Updates, which are several page newsletters about recent Trustee Council actions, upcoming meetings, ongoing activities, and where to find more information.
- Annual work plans, the Restoration Plan, Invitations for Proposals, and other program documents (e.g. GEM program document) are circulated for public review. The Trustee Council considers all public comments on these drafts.

- As needed, the Trustee Council also releases publications related to specific projects such as a set of publications about each region of the spill area and the specific projects that have benefited each region.
- For three years, the Trustee Council funded a production of "Alaska Coastal Currents" a two-minute program about restoration research that aired several times weekly on public radio, accompanied by columns in several regional newspapers. By working through the media, these reports created an avenue for outreach to an even broader community.
- The Trustee Council has a Web site easily accessible to anyone with Internet access and designed for a variety of users from scientists to government resource managers to high school students. The site covers facts about the oil spill, restoration projects, habitat acquisition, and the GEM program and has many major publications and documents that can be downloaded. Information on funding and upcoming events is regularly posted. The URL is http://www.oilspill.state.ak.us.
- The Public Advisory Group is composed of 17 representatives of various stakeholder groups including fishermen, subsistence users, and the public at large. This group provides direct input to the Trustee Council and has visited many spill area communities on annual field trips.
- All Trustee Council and Public Advisory Group meetings are advertised, free, and open to the public. Those unable to attend any meeting can listen and participate via teleconference. Public comment periods are scheduled at each Trustee Council meeting and Public Advisory Group meeting.
- Community meetings have been an important part of the restoration process since the day of the oil spill. These meetings have addressed a wide variety of topics including public participation, the Restoration Plan, TEK, waste management, the GEM program, archaeology, community involvement, and science updates. Over the years, the Trustee Council has sponsored public meetings in the villages of Cordova, Juneau, Chenega, Kodiak, Homer, Valdez, Seward, Seldovia, Tatitlek, Whittier, Anchorage, Fairbanks, Chignik Lagoon, Chignik Lake, Ouzinkie, Port Lions, Karluk, Larsen Bay, Akhiok, Old Harbor, Port Graham, Nanwalek, Kenai/Soldotna, and Perryville.

THE WHITE HOUSE

13175

Office of the Press Secretary

For Immediate Release November 6, 2000

EXECUTIVE ORDER

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CONSULTATION AND COORDINATION
WITH INDIAN TRIBAL GOVERNMENTS

By the authority vested in me as President by the Constitution and the laws of the United States of America, and in order to establish regular and meaningful consultation and collaboration with tribal officials in the development of Federal policies that have tribal implications, to strengthen the United States' government-to-government relationships with Indian tribes, and to reduce the imposition of unfunded mandates upon Indian tribes; it is hereby ordered as follows:

Section 1. Definitions. For purposes of this order:

(a) "Policies that have tribal implications" refers to regulations, legislative comments or proposed legislation, and other policy statements or actions that have substantial direct effects on one or more Indian tribes, on the relationship between the Federal Government and Indian tribes, or on the distribution of power and responsibilities between the Federal Government and Indian tribes.

(b) "Indian tribe" means an Indian or Alaska Native tribe, band, nation, pueblo, village, or community that the Secretary of the Interior acknowledges to exist as an Indian tribe pursuant to the Federally Recognized Indian Tribe List Act of 1994, 25 U.S.C. 479a.

(c) "Agency" means any authority of the United States that is an "agency" under 44 U.S.C. 3502(1), other than those considered to be independent regulatory agencies, as defined in 44 U.S.C. 3502(5).

(d) "Tribal officials" means elected or duly appointed officials of Indian tribal governments or authorized intertribal organizations.

Sec. 2. Fundamental Principles. In formulating or implementing

policies that have tribal implications, agencies shall be guided by the following fundamental principles:

(a) The United States has a unique legal relationship with Indian tribal governments as set forth in the Constitution of the United States, treaties, statutes, Executive Orders, and court decisions. Since the formation of the Union, the United States has recognized Indian tribes as domestic dependent nations under its protection. The Federal Government has enacted numerous statutes and promulgated numerous regulations that establish and define a trust relationship with Indian tribes.

(b) Our Nation, under the law of the United States, in accordance with treaties, statutes, Executive Orders, and judicial decisions, has recognized the right of Indian tribes to self-government. As domestic dependent nations, Indian tribes exercise inherent sovereign powers over their members and territory. The United States continues to work with Indian tribes on a government-to-government basis to address issues concerning Indian tribal self-government, tribal trust resources, and Indian tribal treaty and other rights.

(c) The United States recognizes the right of Indian tribes to self-government and supports tribal sovereignty and self-determination.

Sec. 3. Policymaking Criteria. In addition to adhering to the fundamental principles set forth in section 2, agencies shall adhere, to the extent permitted by law, to the following criteria when formulating and implementing policies that have tribal implications:

(a) Agencies shall respect Indian tribal self-government and sovereignty, honor tribal treaty and other rights, and strive to meet the responsibilities that arise from the unique legal relationship between the Federal Government and Indian tribal governments.

(b) With respect to Federal statutes and regulations administered by Indian tribal governments, the Federal Government shall grant Indian tribal governments the maximum administrative discretion possible.

(c) When undertaking to formulate and implement policies that have tribal implications, agencies shall:

(1) encourage Indian tribes to develop their own policies to achieve program objectives;

(2) where possible, defer to Indian tribes to establish standards; and

(3) in determining whether to establish Federal standards, consult with tribal officials as to the need for Federal standards and any alternatives that would limit the scope of Federal standards or otherwise preserve the prerogatives and authority of Indian tribes.

Sec. 4. Special Requirements for Legislative Proposals. Agencies shall not submit to the Congress legislation that would be inconsistent with the policymaking criteria in Section 3.

Sec. 5. Consultation. (a) Each agency shall have an accountable process to ensure meaningful and timely input by tribal officials in the development of regulatory policies that have tribal implications. Within 30 days after the effective date of this order, the head of each agency shall designate an official with principal responsibility for the agency's implementation of this order. Within 60 days of the effective date of this order, the designated official shall submit to the Office of Management and Budget (OMB) a description of the agency's consultation process.

(b) To the extent practicable and permitted by law, no agency shall promulgate any regulation that has tribal implications, that imposes substantial direct compliance costs on Indian tribal governments, and that is not required by statute, unless:

(1) funds necessary to pay the direct costs incurred by the Indian tribal government or the tribe in complying with the regulation are provided by the Federal Government; or

(2) the agency, prior to the formal promulgation of the regulation,

(A) consulted with tribal officials early in the process of developing the proposed regulation;

(B) in a separately identified portion of the preamble to the regulation as it is to be issued in the Federal Register, provides to the Director of OMB a tribal summary impact statement, which consists of a description of the extent of the agency's prior consultation with tribal officials, a summary of the nature of their concerns and the agency's position supporting the need to issue the regulation, and a statement of the extent to which the concerns of tribal officials have been met; and

(C) makes available to the Director of OMB any written communications submitted to the agency by tribal officials.

(c) To the extent practicable and permitted by law, no agency shall promulgate any regulation that has tribal implications and that preempts tribal law unless the agency, prior to the formal promulgation of the regulation,

(1) consulted with tribal officials early in the process of developing the proposed regulation;

(2) in a separately identified portion of the preamble to the regulation as it is to be issued in the *Federal Register*, provides to the Director of OMB a tribal summary impact statement, which consists of a description of the extent of the agency's prior consultation with tribal officials, a summary of the nature of their concerns and the agency's position supporting the need to issue the regulation, and a statement of the extent to which the concerns of tribal officials have been met; and

(3) makes available to the Director of OMB any written communications submitted to the agency by tribal officials.

(d) On issues relating to tribal self-government, tribal trust resources, or Indian tribal treaty and other rights, each agency should explore and, where appropriate, use consensual mechanisms for developing regulations, including negotiated rulemaking.

Sec. 6. Increasing Flexibility for Indian Tribal Waivers.

(a) Agencies shall review the processes under which Indian tribes apply for waivers of statutory and regulatory requirements and take appropriate steps to streamline those processes.

(b) Each agency shall, to the extent practicable and permitted by law, consider any application by an Indian tribe for a waiver of statutory or regulatory requirements in connection with any program administered by the agency with a general view toward increasing opportunities for utilizing flexible policy approaches at the Indian tribal level in cases in which the proposed waiver is consistent with the applicable Federal policy objectives and is otherwise appropriate.

(c) Each agency shall, to the extent practicable and permitted by law, render a decision upon a complete application for a waiver within 120 days of receipt of such application by the agency, or as otherwise provided by law or regulation. If the application for waiver is not granted, the agency shall provide the applicant with timely written notice of the decision and the reasons therefor.

(d) This section applies only to statutory or regulatory requirements that are discretionary and subject to waiver by the agency.

Sec. 7. Accountability.

(a) In transmitting any draft final regulation that has tribal implications to OMB pursuant to Executive Order 12866 of September 30, 1993, each agency shall include a certification from the official designated to ensure compliance with this order stating that the requirements of this order have been met in a meaningful and timely manner.

(b) In transmitting proposed legislation that has tribal implications to OMB, each agency shall include a certification from the official designated to ensure compliance with this order that all relevant requirements of this order have been met.

(c) Within 180 days after the effective date of this order the Director of OMB and the Assistant to the President for Intergovernmental Affairs shall confer with tribal officials to ensure that this order is being properly and effectively implemented.

Sec. 8. Independent Agencies. Independent regulatory agencies are encouraged to comply with the provisions of this order.

Sec. 9. General Provisions. (a) This order shall supplement but not supersede the requirements contained in Executive Order 12866 (Regulatory Planning and Review), Executive Order 12988 (Civil Justice Reform), OMB Circular A-19, and the Executive Memorandum of April 29, 1994, on Government-to-Government Relations with Native American Tribal Governments.

(b) This order shall complement the consultation and waiver provisions in sections 6 and 7 of Executive Order 13132 (Federalism).

(c) Executive Order 13084 (Consultation and Coordination with Indian Tribal Governments) is revoked at the time this order takes effect.

(d) This order shall be effective 60 days after the date of this order.

Sec. 10. Judicial Review. This order is intended only to improve the internal management of the executive branch, and is not intended to create any right, benefit, or trust responsibility, substantive or procedural, enforceable at law by a party against the United States, its agencies, or any person.

STATE-TRIBAL RELATIONS TEAM

At the Alaska Inter-Tribal Council (AI-TC) Convention on December 4, 1999, Governor Knowles invited federally recognized tribes in Alaska to join him in beginning government-to-government discussions. Speaking to delegates at the conference, Knowles challenged tribal leaders to work with his administration to strengthen and define the state's relationship with tribes and raise it to a new level.

Mission

The goal of the State-Tribal Relations Team (STRT) is to complete an accord, or protocol, establishing a formal relationship between the state and tribes in time for ratification at AI-TC's annual meeting in December 2000. "This is a historic opportunity for us to work together to overcome the challenges facing village Alaska," Knowles said in a letter to Mike Williams, Chairman of the AI-TC.

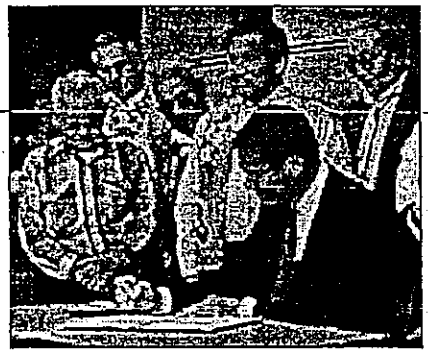
Members

Knowles appointed 12 members to his cabinet-level team in January. In February, tribal leaders selected 46 tribal advocates to serve as their representatives in the process.

| Representatives | Standing Committees |

Links

- Alaska Inter-Tribal Council
- Rural Governance Commission
- Federally Recognized Tribes in Alaska
- BIA Alaska - Tribe Phone/Fax
- Commonwealth North
- "A Short History of the Federal Recognition of Tribes in Alaska and the Evolution of the State's Position"



On Sept. 29, Governor Knowles signed a landmark administrative order acknowledging and honoring the 227 federally recognized tribes in Alaska.

Millennium Agreement between the Federally Recognized Sovereign Tribes of Alaska and the State of Alaska

Governor Knowles joins Alaska tribal leaders in signing the Millennium Agreement: ***11:00 a.m. Wednesday, April 11, 2001 at the Sheraton in Anchorage***

Final Agreement available here

Download Adobe Acrobat Reader

In the News

December 2
Fourth Plenary Session, Anchorage Marriott Downtown, 10:00 a.m
Meeting Agenda
| past meetings |

November 3
Progress Made on State-Tribal Agreement

September 29, 2000
Knowles' Order Acknowledges, Honors Tribes in Alaska
view: [press release | order | speech | photos]

more news...

Administrative Order Correspondence

09/29/00 Governor Knowles' Response: Tribal Delegation Letter

09/28/00 Letter from Sen. Murkowski, Sen. Stevens and Congressman Young Regarding Administrative Order

Millennium Agreement

between the
Federally Recognized
Sovereign Tribes of Alaska
and the State of Alaska
Department of Environmental Conservation

A. Millennium Agreement background

1. Signed April 11, 2001 by the Governor ... 80 of the 229 Tribes have signed.
2. Purpose: confirms the commitment by the State of Alaska and Tribes to overcome impediments to a more constructive dialogue and to implement government-to-government relationships.
3. Objectives
   a. enhance and improve communications
   b. facilitate resolution of issues
   c. work toward greater public recognition, respect, and support for Tribal self-governance and self-determination.
4. Intended to solidify relationships within the political structures of the parties
5. Reinforce the government-to-government relationships through consultation and agreement on matters of mutual concern.

B. Guiding Principles

1. Tribes have the right to self-governance and self-determination ... to determine their own political structures and select their representatives in accordance with respective Tribal constitutions, customs, traditions, and laws.
2. Relationships will be predicated on equal dignity, mutual respect, and free and informed consent.
3. Parties agree to inform one another at the earliest opportunity.
4. Parties have the right to determine their own relationships in a spirit of peaceful co-existence, mutual respect, and understanding.
5. Parties will respect fundamental human rights and freedoms in the exercise of their respective political authority.

C. Implementation Process & Responsibilities

1. Accountability, education, and consultation
   a. Each Tribe and the state will develop an effective process to permit representatives of the other to provide meaningful and timely input on matters that significantly or uniquely affect that government.
   b. Consultations shall be undertaken in good faith to resolve issues of mutual concern ... the parties will strive to achieve consensus, agreement, or mutual consent.
   c. department education process with Governor's Office participation
   d. Each Tribe will designate an official to be responsible and accountable for its own implementation ... chief of staff is the designated official for the State of Alaska.
2. State-Tribal Forum
   a. for annual ongoing dialogue at the highest level
   b. Governor will invite participation from the legislative and judicial branches
   c. review and evaluate implementation of the Agreement

Millennium Agreement

between the

Federally Recognized Sovereign Tribes of Alaska and the State of Alaska

---

I. PREAMBLE

1. Tribes exist in Alaska. Since time immemorial, indigenous peoples have lived on their land in organized societies and distinct traditional cultures with their own forms of autonomous sovereign government that predate the United States and the State of Alaska.

2. This AGREEMENT, dated April 11, 2001, is executed between each of the federally recognized sovereign Tribes of Alaska that are signatory to this AGREEMENT (hereinafter the "Tribes"), through their Tribal Governments, and the State of Alaska, through its Governor, in order to better achieve mutual goals through an improved relationship between their governments. This AGREEMENT provides a framework for the establishment of lasting government-to-government relationships and an implementation procedure to assure that such relationships are constructive and meaningful and further enhance cooperation between the parties.

3. Each party to this AGREEMENT acknowledges the sovereignty of the others. The parties share particular respect for the values and cultures of Alaska's indigenous peoples. Further, the parties share a desire for an agreement between the State of Alaska and the Tribes that reflects full government-to-government relationships.

4. The parties desire that this AGREEMENT between the Tribes and the State of Alaska be strong enough to withstand the test of time and ensure fair treatment of both the Tribes and the State of Alaska.

II. PARTIES

5. The parties to this AGREEMENT are the State of Alaska and the signatory Tribes.

6. As of the date of this AGREEMENT, there are 229 federally recognized Tribes in the State of Alaska. Each Tribe is a unique government with different management and decision-making structures and distinct customs, traditions, practices, and values.

d. . establish work groups to facilitate interdepartmental dialogue and coordination with Tribal government representatives on issues relevant to more than one state department or agency.

3. Oversight Office, Council, or Commission
   a. Parties recognize a need for a centralized office, council, or commission to oversee Tribal-state relations.
   b. Functions of this body...
      (1) review, monitor, and recommend policies on related issues
      (2) work toward greater understanding, tolerance, sensitivity, and awareness
      (3) compile and disseminate information about Tribal and state government services
      (4) develop and sponsor programs to inform people of services available ... to inform public and private agencies about Tribal and citizen needs and concerns
      (5) encourage and support public and private agencies to expand and improve their services for Tribal members/citizens
      (6) promote increased participation by Tribal members/citizens in state government affairs
      (7) report to Tribes, Governor, and Legislature on matters of concern under the Agreement.
   c. Parties established a temporary committee for the sole purpose of researching and developing proposals or guidelines for how such a body may be established.
4. Procedures, protocols, and key contacts
   a. Each department to establish protocols and procedures to implement the Agreement in consultation with Tribal Government leaders
      (1) specifically for "mutual consultation on matters that significantly affect concerned parties."
   b. Tribal governments are encouraged to share with the state their current Tribal structures, methods of decision-making, procedures, and names of relevant Tribal personnel
   c. Each party to identify "key contacts" for coordination.
5. Coordination of Agreement implementation -- Alaska Inter-Tribal Council to provide support, coordination, and facilitation of meetings.

D. Resolution of disputes and Amendments

1. conflicts or disputes pertaining to the meaning, interpretation, or methodology of the Agreement to be brought before the State-Tribal Forum for resolution.
2. Each Tribe has the right to elevate an issue of importance to any executive decision-making authority and visa versa.
3. Amendments to be presented before the State-Tribal Forum for discussion before circulation to all parties ... each party has 90 days from circulation to approve the proposed amendment ... proposed amendment takes effect only if approved by all parties responding.

7. The State of Alaska is organized into three branches of government: executive, legislative, and judicial. The executive branch is divided into principal departments under the authority of the Governor.

III. GUIDING PRINCIPLES

8. The following guiding principles shall facilitate the development of government-to-government relationships between the Tribes and the State of Alaska:

   (a) The Tribes have the right to self-governance and self-determination. The Tribes have the right to determine their own political structures and to select their Tribal representatives in accordance with their respective Tribal constitutions, customs, traditions, and laws.
   (b) The government-to-government relationships between the State of Alaska and the Tribes shall be predicated on equal dignity, mutual respect, and free and informed consent.
   (c) As a matter of courtesy between governments, the State of Alaska and the Tribes agree to inform one another, at the earliest opportunity, of matters or proposed actions that may significantly affect the other.
   (d) The parties have the right to determine their own relationships in a spirit of peaceful co-existence, mutual respect, and understanding.
   (e) In the exercise of their respective political authority, the parties will respect fundamental human rights and freedoms.

IV. PURPOSES

9. This AGREEMENT confirms the commitment by the parties to overcome any and all impediments to a more constructive dialogue and to implement government-to-government relationships. The objectives of this AGREEMENT include (1) enhancing and improving communication between the parties, (2) facilitating the resolution of issues to avoid potentially adverse effects on any party, and (3) working toward greater public recognition, respect, and support for Tribal self-governance and self-determination.

10. This AGREEMENT is intended to build confidence among the parties in the government-to-government relationships by outlining a process for its implementation. It is also intended to solidify such relationships within the respective political structures of the parties. The parties will strive to reinforce the government-to-government relationships through consultation and agreement on matters of mutual concern. This AGREEMENT does not, in itself, address substantive issues.

11. The parties commit to the full implementation, effectiveness, and permanence of this AGREEMENT. The parties further commit, through these government-to-government relationships, to provide more efficient, improved, and beneficial services to all Alaskans and, in particular, to Tribal members/citizens. This AGREEMENT provides the foundation and framework for further and more specific agreements between two or more of the parties outlining methods, mechanisms, and policies to address and resolve matters of concern to the Tribes.

12. In furthering the objective of positive government-to-government relationships, the State of Alaska acknowledges that:

(a) Each Tribe has its own independent form of government and exercises inherent sovereign authority;
(b) Actions undertaken by the State of Alaska in relation to the Tribes must be implemented in an informed and sensitive manner, respectful of Tribal sovereignty and Alaska Native traditional and cultural values, beliefs, and principles; and
(c) The development of strong, reliable government-to-government relationships between the State of Alaska and the Tribes will be beneficial to all Alaskans.

13. In furthering the objective of positive government-to-government relationships, the Tribes acknowledge that:

(a) The State of Alaska operates under the authority given by the United States Constitution, the Alaska Constitution, and state laws and regulations;
(b) The State of Alaska has a major responsibility to provide for the health, safety, and welfare of all Alaskans;
(c) Actions taken by the Tribes that affect or may affect non-Tribal members must be implemented in an informed and sensitive manner, respectful of individual rights; and
(d) The development of strong, reliable government-to-government relationships between the Tribes and the State of Alaska will benefit all Alaskans.

14. The parties recognize that implementation of this AGREEMENT requires a comprehensive educational effort to promote understanding of the government-to-government relationships within their own governmental organizations and with the general public.

V. IMPLEMENTATION PROCESS AND RESPONSIBILITIES

15. This AGREEMENT commits the parties to the following tasks:

A. Accountability, Education, and Consultation

16. The parties shall ensure that officials working to resolve issues of mutual concern will act in a manner consistent with the spirit, intent, and purposes of this AGREEMENT. Each Tribe and the State shall develop an effective process to permit representatives of the other to provide meaningful and timely input on matters that significantly or uniquely affect that government. Consultations carried on in application of this AGREEMENT shall be undertaken in good faith and in a form appropriate to the circumstances. In working to resolve these issues of mutual concern, the parties will strive to achieve consensus, agreement, or mutual consent.

17. The Governor has designated his chief of staff to be responsible and accountable for the State of Alaska's implementation of this AGREEMENT, including interdepartmental coordination. State department heads are accountable to the Governor through the chief of staff for the related services and activities of their respective departments.
18. The Office of the Governor will assist the chief of staff in implementing this AGREEMENT by providing State department heads with information to educate their employees and constituent groups about the requirements of, and principles for, upholding the government-to-government relationships.

19. Each Tribe also recognizes that a system of responsibility and accountability within its governmental departments is essential to successful implementation of this AGREEMENT, and each Tribe will designate an official to be responsible and accountable for its own implementation of this AGREEMENT.

20. As a component of the system of responsibility and accountability within the State and Tribal governments, the parties will review and evaluate the implementation of the provisions of this AGREEMENT at the annual meeting of the State-Tribal Forum, described in Paragraph 21 below. Authors selected by both the Tribes and the State of Alaska will prepare a management report summarizing this evaluation; the report will include mutually acceptable strategies and agreements to outline tasks, overcome obstacles, and achieve specific goals.

B. State-Tribal Forum

21. The parties recognize the need for ongoing dialogue, at the highest level, between the Tribes and the State of Alaska. Therefore, a permanent State-Tribal Forum will be established to initiate and maintain such dialogue. The State-Tribal Forum shall include Tribal government political leaders or their designees and the Governor or his designee and appropriate cabinet officials. The Governor will invite the participation of representatives from the legislative and judicial branches of state government to enhance their participation in the process of creating government-to-government relationships between the State of Alaska and the Tribes. The State-Tribal Forum shall be held at least once annually.
22. The parties to this AGREEMENT will set a date for the first State-Tribal Forum within 60 days of the initial signing of this AGREEMENT.

23. At the first State-Tribal Forum following execution of this AGREEMENT, the parties shall establish "working groups" in order to facilitate interdepartmental dialogue and coordination with Tribal government representatives on issues that are relevant to more than one State department or agency. The working groups shall meet at least twice a year and report annually to the Governor and the Tribes at the State-Tribal Forum.

C. Oversight Office, Council, or Commission

24. The parties recognize the need for a centralized office, council, or commission to oversee Tribal-State relations. The functions of this body shall include, but not be limited to, the following:

(a) Review, monitor, and recommend policies on issues related to Tribal-State relations;
(b) Work toward greater understanding, tolerance, sensitivity, and awareness among Alaska's peoples and between Tribal and State government officials and representatives;
(c) Compile and disseminate information about Tribal and State government services;
(d) Develop and sponsor programs to inform Tribal members/citizens and non-Tribal citizens of the services available to them and to make Tribal needs and concerns known to the public and private agencies whose programs and activities serve or affect them;
(e) Encourage and support public and private agencies to expand and improve their services for Tribal members/citizens;

(f) Assess effects of state programs on Tribes and Tribal members/citizens and make recommendations to the appropriate agencies, as well as periodic follow-up of such agencies and programs;
(g) Promote increased participation by Tribal members/citizens in State government affairs; and
(h) Report to the Tribes, the Governor, and the Alaska State Legislature on all matters of concern under the AGREEMENT.

25. In order to develop such an office, council, or commission, the parties shall establish a temporary committee for the sole purpose of researching and developing proposals or guidelines for how such a body may be constituted, structured, and governed. The committee will be comprised of no less than four State officials and four Tribal officials. The committee will complete its recommendations within 90 days of the initial signing of this AGREEMENT. The committee will seek public comment before finalizing its recommendations. The parties agree that efforts will be made to consult with State legislators in order to increase, improve, and enhance legislative participation in Tribal-State relations.

D. Procedures, Protocols, and Key Contacts

26. The parties recognize that there is a need to develop mechanisms for ongoing clear, consistent, and direct dialogue between the Tribes and State departments on a variety of issues in order to give full effect to the government-to-government relationships.

27. Cabinet officials, in consultation with Tribal Government leaders or their designees, will establish protocols and procedures within their respective agencies to implement this AGREEMENT. These protocols and procedures should ensure mutual consultation on matters that significantly affect concerned parties. Once these protocols and procedures have been adopted, all supervisory and management-level employees in State departments shall be informed of their provisions.

28. Tribal governments are encouraged to share their current tribal structures, methods of decision-making, procedures, and the names of relevant tribal personnel with the State.

29. Each party shall identify "key contacts" in its respective government for coordination between the State of Alaska and the Tribes to ensure the promotion of dialogue between State departments and the Tribes.

E. Coordination of AGREEMENT Implementation

30. The parties agree to work with the Alaska Inter-Tribal Council (AI-TC) to provide logistical support, coordination, and facilitation of meetings of the parties.

VI. SOVEREIGNTY AND DISCLAIMERS

31. In executing this AGREEMENT, no party waives any rights, including treaty rights, immunities, sovereign immunities, or jurisdiction it may possess. This AGREEMENT in no way diminishes any rights or protections afforded any persons or entities, whether parties or

not, under applicable tribal, state, federal, or international law. Through the provisions of this AGREEMENT the parties strengthen their collective ability to successfully address and resolve issues of mutual concern. This agreement is a policy directive and does not create legally binding or enforceable rights. By signing this AGREEMENT no party is making an admission, nor may this document be used in any court of law.

32. The government-to-government relationships between the Tribes and the State of Alaska shall in no way alter or diminish the unique relationship that Tribal governments have with the federal government or any other government.

VII. RESOLUTION OF DISPUTES AND AMENDMENTS

33. Conflicts or disputes between parties pertaining to the meaning, interpretation or methodology of this AGREEMENT will be brought before the State-Tribal Forum for resolution.

34. Each Tribe has the right to elevate an issue of importance to any executive decision-making authority of the State of Alaska. The State of Alaska has the right to elevate an issue of importance to any decision-making authority of the Tribe concerned.

35. Any signatory party may propose amendments to this AGREEMENT. Proposed amendments must be presented to the State-Tribal Forum at its next meeting for discussion before circulation to all parties. The party proposing the amendment is responsible for circulating the amendment to all signatories. Each party shall have ninety days from circulation to approve the proposed amendment by resolution or otherwise. The proposed amendment takes effect only if approved by all parties responding.

VIII.SIGNATORIES AND PARTICIPATION

36. The parties encourage Tribes that are not initial signatories to this AGREEMENT to join in as subsequent signatories with full rights of participation in its implementation.

37. A party may withdraw its participation from this AGREEMENT upon 90 days written notice to all other parties to the AGREEMENT.

38. All signatories shall promote respect for and full realization of the provisions of this AGREEMENT. The initial signatory parties have executed this AGREEMENT on this 11th day of April 2001, and have agreed to be duly bound by its commitments.

Exxon Valdez Oil Spill Trustee Council

441 W. 5th Ave., Suite 500 • Anchorage, Alaska 99501-2340 • 907/278-8012 • fax 907/276-7178

FAX COVER SHEET

Trustee Council Members

Dave Gibbons / Maria
Michele Brown
Drue Pearce
Frank Rue
James Balsiger
Craig Tillery

From: Molly

Date: 10/25/02 Pages 13 with cover

Comments:
The following goes with the Tribal information in the TC binder for Oct 29 mtg.

HARD COPY TO FOLLOW: NO

Document sent by:

Molly McCammon

From: Patty Brown-Schwalenberg [alutiiqpride@crrcalaska.org]
Sent: Friday, October 11, 2002 4:09 PM
To: Molly McCammon
Subject: Agenda

Hi Molly. We just got done with our meeting and thought I'd let you know how its going. I haven't had time to write up a formal agenda, but here's the general idea. The Tribes are interested in pursuing the idea of developing an MOU with the Trustee Council. The MOU would lay out the provisions of the Millennium Accord, as well as the federal Native American policies pertinent to the Trustee Council. It would also include a section on meaningful Tribal consultation, thereby setting out a strategy for dealing with the Tribes on a government-to-government basis in matters directly related to GEM. As a result of the MOU, issues of concern to the Tribes could be addressed in a way that is agreeable to both parties. A portion of the agenda could also include information on good Tribal consultation models such as what was used in the planning process for the Chugach National Forest Management Plan or the co-management model used with the Migratory Bird Co-Management Council.

At this point, these are ideas we would like to discuss. I think these topics are something we can reasonably cover in two hours. I welcome your thoughts.

Thanks.

Patty

Patty Brown-Schwalenberg, Executive Director
Chugach Regional Resources Commission
4201 Tudor Centre Drive, Suite 300
Anchorage, Alaska 99508
907/562-6647
Fax: 907/562-4939
alutiiqpride@crrcalaska.org

Department of Environmental Conservation
Policy on Government-to-Government Relations with the Federally-Recognized Tribes of Alaska

Purpose:

This policy reinforces government-to-government relationships between the Department of Environmental Conservation and the tribes in Alaska through consultation on significant matters of mutual concern.

This department policy procedures provide guidance to all employees of the department involved in any department action(s) that significantly or uniquely affect a tribe, and pertaining to any tribal action that significantly or uniquely affects this department. It also reinforces the foundation for establishing and maintaining effective government-to-government communications between the department and tribes, and promotes consultation and coordination with these tribes, with the goal of ensuring that the department conducts consultation in a culturally sensitive manner.

Policy:

The department is committed to consulting with tribes as early in the department's decision-making process as practicable, and as permitted by law, before taking department action, except that the department is not committed to consulting with tribes in those instances described in "Limitations on Consultation" below. Consultation will provide meaningful participation by the affected tribe, with the goal of achieving informed decision-making.

Responsibilities, Process, and Protocols:

To ensure that the department's processes and procedures throughout all of Alaska are generally uniform and consistent, while maintaining necessary flexibility, the department will adhere to the following steps when consulting with a tribe:

1. Notice to Affected Tribe. The department will make a good faith effort to notify a tribe, at the earliest practicable time, of any proposed department actions. When circumstances permit, the department will afford the tribe a reasonable time to respond to any notification and to participate in consultation with the department. Consultation should continue throughout the department's decision-making process, except where prohibited by law or subject to limitations described in paragraph 10 below. If the department determines that any state or federal law prohibits continued consultation at a specified point in the decision-making process, the department shall so inform the tribe at the outset of the consultation process, or as soon as possible after the department becomes aware of the prohibition.

2. Dissemination of Information. At the outset of the consultation process, the department will provide the affected tribe with sufficient information about the proposed action to ensure that the tribe can properly assess and respond to such proposed action.

3. Identification of the Participants. The department and the affected tribe will identify their respective representatives for the consultation process. The department should work with the tribal representative of the affected tribe to identify any other affected tribe that should be involved in the consultation.

4. Authorized Initiators. Any member of the department with decision-making authority regarding an action that significantly or uniquely affects a tribe is authorized to initiate a request for consultation with the tribe. The department will likewise accept an unsolicited request for consultation from any representative of a tribe who has decision-making authority on behalf of that tribal government. The department member will provide timely notification to the department's "key contact" regarding any consultation.

5. Consultation Process. Consultation should include processes for ongoing communications between the parties that will be established by mutual agreement whenever possible. The department will, at the beginning of the consultation, work with the affected tribe to develop a mutually agreed upon list of participants, establish a timeline, and establish the method and frequency of communication to be used during the consultation. At the conclusion of the consultation, the department will notify the tribe of any final department decisions on a proposed action in a reasonable time period prior to the time that the decision takes effect, unless extraordinary or emergency circumstances preclude it.

6. Tribal Request for Consultation. The department will maintain a list of its "Key Contacts" and will provide a copy of this list to the tribes. This list will include any information that the tribes may need to contact the "Key Contacts." Any time a tribal government desires to request government-to-government consultation regarding a matter that significantly or uniquely affects the tribe, or to notify the department of any tribal action that may significantly or uniquely affect the department, the tribe should contact one of the Key Contacts and provide them with this information.

7. Inter-Departmental Cooperation. The department will work cooperatively with other state agencies, and as appropriate, with federal agencies to accomplish the goals and responsibilities outlined in this policy. Requests for consultation that are determined to be out of the department's purview will be referred to the appropriate "Key Contact" of another state agency.

8. Working Group Participation. The department recognizes the importance of participation in the Working Groups established within the State-Tribal Forum to facilitate meaningful dialogue regarding issues of concern to the state and the tribes. The department will make a good faith effort to ensure that its Key Contacts participate in all meetings of any Working Group that includes the department.

9. Exclusions. Department activities relating to actual or suspected violations of state law, or to criminal investigations or initiation of the criminal justice process, civil law enforcement investigations, initiation of the civil law enforcement process, or civil litigation are exempt from this policy. Nothing in this policy is intended to prohibit communication between authorized representatives of parties in litigation.

10. Limitations on Consultation. The Department of Environmental Conservation is not committed to consulting with tribes if such consultation could result in an infringement or breach of any applicable privileges, including but not limited to the attorney-client privilege, executive privilege, work product doctrine, deliberative process privilege, and law enforcement confidentiality requirements or privileges.

11. Other Considerations. Consultation on development of regulations will occur in accordance with the Administrative Procedure Act and pertinent laws and regulations. Nothing in this policy is intended to supercede or replace the department's obligation to comply with the Constitution, statutes, and regulations of the State of Alaska. Nothing in this policy is intended to prohibit constructive communication between the department and a tribe.

General Provisions:

1. This policy is intended to assure consistency within the different divisions and offices of the department and to improve the internal management of the department.

2. This policy clarifies the department's protocol for consulting with tribes in a government-to-government relationship. Each division may further amplify its protocols with staff instructions to support these policies and procedures.

3. This policy shall be effective upon signature of the Commissioner of the Department of Environmental Conservation.

4. This Policy is not intended to expand, contract, or otherwise diminish or limit the sovereignty held by the State of Alaska or any tribe.

Definitions for the purposes of this Policy:

1. "Tribe" means any tribe in Alaska that is on the list of federally-recognized tribes published by the federal Bureau of Indian Affairs.

2. "Consultation" means the timely process of meaningful inter-governmental dialogue between department divisions or offices and tribes regarding a proposed department action. When assessing what action will be subject to consultation, the department will take into account the cultural and tradition activities of tribes and any relevant state or federal law. "Consultation" may take place by in-person meeting, teleconference, videoconference, exchange of written documents or e-mail, or other means appropriate to the circumstances.

3. "Department Action" means any proposed action, activity, decision, legislation submitted by the governor to the legislature, development of regulations, permits (other than general permits and permits issued by rule), plan, policy, procedure, program, project, service, or other action that has a significant or unique effect on a tribe, including the tribe's cultural and traditional activities, other than those described below under Exclusions provision.

4. "Department" means the State of Alaska, Department of Environmental Conservation.

Dated: February 27, 2002

Commissioner
Department of Environmental Conservation

State of Alaska
Department of Environmental Conservation
RECORD OF CONSULTATION

Tribe:
Tribal Representative:
DEC Representative:
Requestor:
Date of Request:

Description of Departmental Action:

How does this action significantly affect the Tribe?

Consultation Participants:

Time line, frequency, method of consultation:

Outcome:

Notification to Tribe of Outcome:

1

MEMORANDUM

January 18, 2001

To: Niles Cesar, Bureau of Indian Affairs
Fran Cherry, Bureau of Land Management
David Allen, U.S. Fish and Wildlife Service
Rob Arnberger, National Park Service
Gordon Nelson, U.S. Geological Survey
John Goll, Minerals Management Service

From: Marilyn Heiman
Special Assistant to the Secretary for Alaska

Subject: Alaska Government-to-Government Policy

Almost a year ago, we embarked on an effort to develop a Government-to-Government Policy for Alaska to guide the consultation process with tribes on policies that directly affect them. The first draft was developed by Albert Barros from the Minerals Management Service in Alaska and reviewed by the Native Liaisons from all of the Interior agencies in Alaska. That draft was sent to all of the members of the Alaska Cooperative Planning Group (ACPG) for your approval to distribute to the tribes as a draft for comments. My office subsequently sent it to all 227 tribes by both e-mail and regular mail. In addition, I spoke to the BIA Tribal Provider's Conference, with an attendance of over 1000 tribal representatives, and the Alaska Inter-Tribal Council (AI-TC) annual meeting to inform the tribes of the draft policy and to get their feedback.

In order to get thorough review by the agencies and the tribes, we developed a working group made up of the Native Liaisons and representatives of the Alaska Inter-Tribal Council and myself. This working group met with over 75 tribal members at a workshop of the BIA Tribal Providers Conference to obtain comments and recommendations. In addition, this working group held several meetings to incorporate comments and suggestions of the tribes and agencies both in Alaska and Washington, DC. It has been a truly arduous process and many hours of blood, sweat and tears have gone into this document.

I am proud to inform you that we have finally gotten consensus from all of the bureaus on a Government-to-Government Policy for Alaska. It is attached for your signature. Also, attached is a list of non-binding recommendations that were developed by the Alaska Inter-Tribal Council.

I especially want to express my appreciation to your Native Liaisons Albert Barros, Brenda

TakesHorse, Herb Anungazuk, Fred Armstrong, and Tim DeAsis. I also want to thank Larry Merculieff and Deborah Vo from AI-TC; Dennis Hopewell from the Alaska Solicitors Office for his patience and drafting; and Michael Baffrey, Martha Vlasoff, and Ginny Kalbach from my staff for their hard work and dedication to this effort. Their collective work was invaluable.

I think this policy is an excellent first step for providing guidance on government-to-government consultations. Thank you again for making this policy a reality.

Enclosures
cc/enc: Sharon Blackwell
Nina Hatfield
Marilyn Nickels
Marshall Jones
Jerry Cordova
Paul Kirton
Lauri Adams
Dennis Hopewell
Martha Vlasoff
Michael Baffrey
Mike Williams
Deborah Vo
Larry Merculieff
Jeanine Kennedy
Carol Daniel
Lare Aschenbrenner
Heather Kendall-Miller

Department of the Interior-Alaska
Policy on Government-to-Government Relations
with Alaska Native Tribes

Purpose:

To assure compliance with the Department of the Interior's national intention, dedication and commitment to work with all federally recognized Tribes as required by the President's April 29, 1994, Executive Memorandum on Government-to-Government Relations with Native American Tribal Governments, and Executive Order No. 13175, November 6, 2000, on Consultation and Coordination with Indian Tribal Governments, on a Government-to-Government basis.

Introduction:

Federally recognized Tribes have a special, unique legal and political relationship with the Government of the United States as defined by the U.S. Constitution, treaties, statutes, court decisions, and executive orders. These definitive authorities also serve as the basis for the Federal Government's obligation to acknowledge the status of federally recognized Tribes in Alaska.

This Alaska policy, involving federally recognized Tribes in Alaska, is to provide guidance to all employees, officers, and agents of the Agencies involved with a Federal action(s) that will have a substantial, direct effect on federally recognized Tribes in Alaska. It is also intended to promote and reinforce the foundation for establishing and maintaining effective governmental communications, consultation, and coordination with federally recognized Tribes in Alaska, and to ensure that the consultation process is conducted in a culturally sensitive manner.

Definitions: For the purposes of this Policy:

1. "Federally Recognized Tribe(s) in Alaska" means Tribes with the rights and authorities as defined by the U.S. Constitution, applicable laws, statutes, court decisions, and executive orders. In addition, a federally recognized Tribe is any Tribal entity that the Secretary of the Interior acknowledges to exist as a Tribe pursuant to the Federally Recognized Indian Tribe List Act of 1994, 25 U.S.C. 479a. Such Tribes appear on the list published periodically in the Federal Register by the Bureau of Indian Affairs as Entities Recognized and Eligible to Receive Services from the United States.

2. "Consultation" means the timely process of meaningful intergovernmental dialogue between Departmental Bureaus and/or Offices and federally recognized Tribes in Alaska regarding a

James G. (Jim) King
1700 Branta Road
Juneau, Alaska 99801-7918

Molly McCammon, Executive Director
EVOS Restoration Office
441 W. 5th Ave.
Anchorage, AK 99501-2340

7/30/02

Dear Molly,

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I do hope you and the Trustee Council will consider this matter.

Thanks for listening – again.

Sincerely, Jim

Jim King, Member PAG

CC: Chuck Meachum

MSNBC
August 8, 2002
Exxon Valdez report tracks wildlife
MSNBC Staff and Wire Reports

ANCHORAGE, Aug. 8 — Some seabirds and salmon species have fully recovered from the 1989 Exxon Valdez oil spill but other wildlife like herring, ducks, harbor seals and loons have yet to show signs of recovery, the government panel overseeing restoration of Alaska's Prince William Sound has concluded. The panel also decided against classifying killer whales, also known as orcas, as having recovered from the 11 million gallon spill.

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She was responding to differences between scientists who advised the council and local residents, who lobbied to keep orcas off the "recovered" list and to keep herring and harlequin ducks listed as "not recovering" instead of "still recovering."

Paradise Lost

The Alaska Center for the Environment welcomed the report, which updates a 1999 listing. "We are happy to see that they listened to public sentiment and that there are still concerns about the lingering oil that is out there," said the center's Michelle Wilson.

Exxon Mobil has taken issue with the way the trustee council tracks damaged species and resources, arguing that it uses a flawed definition of "recovery."

Exxon Mobil has said the definition requires a return to pre-spill numbers, even though other factors, such as climate shifts, are causing massive changes in Alaska's wildlife.

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Fully recovered: two types of seabirds — common murres and black oystercatchers — as well as pink salmon and sockeye salmon were added to this category. They join bald eagles and river otters as the only species considered fully recovered.

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SOURCES: U.S. Coast Guard, EarthBase, Inc., MSNBC research

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The council's evaluation of the recovery status of resources could have financial implications for Exxon Mobil. One settlement clause allows for up to $100 million in additional payments if there are damages unforeseen in 1991.

Additional background from the trustee council is online at www.oilspill.state.ak.us.

Reuters contributed to this story.

ANCHORAGE DAILY NEWS
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OUR VIEW

Exxon's science

Attack on government research was unfounded

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Professor Page, the Exxon researcher, responded by attacking Mr. Short's research ethics. "We saw no evidence that Short dug 7,000 pits on 91 locations. ... Had thousands been dug, we would have located many more." Professor Page accused Mr. Short of subjectively choosing "worst-case locations," indicating a "strong bias" that "raises questions about the scientific validity" of his conclusions.

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That review vindicated Mr. Short. His study was "rigorous, well-designed and executed." The records for all stages of the work were "excellent." There were a handful of minor record-keeping discrepancies, but the number was "not unusual in a project of this magnitude."

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Coreys #5
Tupper Lake N.Y. 12986
October 4, 2002

Exxon Valdez Oil Spill Trustee Council
441 W.5th. Ave. suite 500
Anchorage, AK 99051-2430

Dear Sir:

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You are urged to insist that Exxon repay the public for the continuing damage which will certainly extend into centuries ahead.

Thank you for acting in the interest of the public and the unexploited environment.

Sincerely,

Clarence Petty

Clarence Petty

Library honored as best

First Lady, others plan to present long-delayed national award this month

By Rose Ragsdale
Business editor

For most Americans, Sept. 11, 2001, will live in memory as a day of terror and tragedy.

But for six librarians in Anchorage, it also will be remembered as a near triumph.

That morning, Robert Martin, the newly appointed director of the Institute of Museum and Library Services, was scheduled to announce the winners of the 2001 National Award for Museum and Library Service.

Alaska Resources Library and Information Service (ARLIS) in Anchorage topped the list. The other five winners were: Children's Discovery Museum of San Jose, San Jose, Calif.; Hancock County Library System, Bay Saint Louis, Miss.; Miami Museum of Science, Miami; New England Aquarium, Boston; and Providence Public Library, Providence, R.I.

Bestowed yearly by the Institute of Museum and Library Services, the awards enable the federal agency to highlight the work of the nation's 10,000 museums and 122,000 libraries. The awards recognize museums and libraries that have uplifted individuals' lives, improved their communities, and made the nation better for it, according to a Sept. 11, 2001, press release.

First Lady Laura Bush praised the honorees in the press statement and announced a White House ceremony to be held in their honor on Sept. 17, 2001. But the ceremony was canceled in the aftermath of the terrorist attacks on the World Trade Center and the Pentagon.

More than a year later, ARLIS will get another shot at the spotlight. A Rose Garden ceremony has been scheduled for Oct. 29 to honor both the 2001 and 2002 winners of the National Award for Museum and Library Service. ARLIS' staff has been invited to travel to Washington, D.C. for the presentation.

"We all had worked very hard ... and it felt like somebody had taken something away from us on some level," said librarian Nancy Tileston, recalling Sept. 11 a year ago.

The disappointment of not receiving the award soon paled in comparison to the trauma of the terrorist attacks, but the experience undermined the reality of winning the award for Tileston.

"For me, it's still a little bit of 'I'll believe it when I see it,' " even though plane tickets have been purchased and reservations have been made, she said.

Carrie Holba, ARLIS' reference services coordinator, said the award is a tremendous honor because it is the only national award given to libraries across the nation.

ARLIS was chosen for the award because it consolidated and preserved more than 150,000 Alaska natural and cultural resources from seven federal, state, and university libraries slated for closure or downsizing.

"ARLIS' staff literally saved the collections from extinction," the Library Institute's Martin said in a statement. "In the process, ARLIS became the single largest source of Alaska resources information. ARLIS' knowledgeable staff facilitates wise development and conservation in Alaska by providing unbiased and universal access to information for scientists and the public," he added.

Since ARLIS opened in 1997, the library has focused on making available to the Alaska scientific community and the public a vast storehouse of information, including a circulating collection of animal skulls, skins and mounted birds. ARLIS also offers books, technical reports, journals, maps, videos and photographs.

The library operates with team-based management. In addition to Tileston from U.S. Fish and Wildlife Service and Holba from the Exxon Valdez Oil Spill Trustee Council, ARLIS is managed by Team Librarian Julie Braund-Allen, from the University of Alaska Anchorage Environment and Natural Resources Institute; Team Librarian Tina Huffaker, from Minerals Management Service; Collection Development Coordinator Celia Rozen, from the Alaska Department of Fish and Game; and Budget Coordinator Cathy Vitale, from the Bureau of Land Management.

Holba said ARLIS is unique. "You have consortium arrangements between libraries, but there's nothing like us out there," she said. "We actually consolidated nine collections into one building."

Though ARLIS functions as one organization, its librarians still work for their respective agencies, which have different holidays and different operating procedures. The library's $1.5 million annual budget also is funded by different sources with different fiscal years.

In addition to its member agencies, the library serves a diverse audience, including educators, other federal and state agencies and the general public. ARLIS, for example, serves as UAA's science library, Holba said.

In fiscal 2002, ARLIS recorded 20,000 visitors and 13,000-15,000 reference requests. It also processed 15,000 interlibrary loans.

Putting it all together is very challenging and requires lots of paperwork and coordination.

Add to that growing budgetary constraints.

Holba cited a recent major rent increase at ARLIS' quarters at 3150 C Street. To make ends meet, ARLIS' publications budget took a $30,000 hit, she said.

"While we can't spend glory, the publicity from the award will hopefully call attention to our budget plight and ultimately bring about some relief," Holba said.

Meanwhile, the library is making do, but needs additional funds to catalog a huge backlog of donated collections to enable patrons to use them, the librarians say.

ARLIS' staff is hoping to gain legislative authority to bring in funds from other sources to pay for the cataloguing and other needs.

"We just need more partners," Tileston said. "This is one of those instances where throwing money at the problem would fix it."

Cherri Womac

From: realhelp@alaska.net

Sent: Saturday, October 19, 2002 11:35 AM

To: molly_mccammon@oilspill.state.ak.us

Cc: katharine_miller@oilspill.state.ak.us; debbie_hennigh@oilspill.state.ak.us; bob_walker@oilspill.state.ak.us; sandra_schubert@oilspill.state.ak.us; phil_mundy@oilspill.state.ak.us; restoration@oilspill.state.ak.us

Subject: opinion-herring decline; worker health needs

Dear Molly McCammon,

There is a theory not explored about the 1993 herring that were bleeding through their scales and couldn't swim straight. At the time, & even still, there is extreme secrecy about what the inipol EAP 22 bioremediation chemicals contained (EPA won't tell you, by the way) ... a very strong dose of **2-butoxyethanol that causes blood, skin, liver, kidney damage, central nervous system damage**, etc.

Also, at levels of the waters that were below 4 C no biodegrading takes place. So had the herring's fat tissues been autopsied for the chemicals in inipol EAP 22... especially 2-butoxyethanol? Maybe they swam through these chemicals & were affected by them? Why not check the Steller sea lion population for a similar fat biopsy?

ALSO, so sad to see Exxon giving away 13 million to National Victims of Crime fund when they have caused extreme health damage to all workers of the bioremediation who used inipol EAP 22. It would be miraculous if any worker did not have hemolytic anemia (body's premature destruction of its own red blood cells) Find the workers... who have no idea the seriousness of their health... & you will find the truth. Records now cannot be found, most likely. Exxon will not give a worker his own blood testing that they did.

Of course **inipol EAP 22** was an Exxon product with MSDS by Exxon, 2 days after EPA approved the experimental fiasco of inipol EAP 22. Without the 'dry cleaning' solvent... would the beaches have looked so good? I think not. More young men, now in their 30s would have their health & life.

So why don't you study the health issue of workers?
... & don't forget those on the boats and the longshoremen, too. They are also affected as are non-workers who came by at the wrong time. If you wish to know what I'm learning: www.blessinghouse.com/inipol and please be aware, it was very difficult to find all the ingredients of inipol EAP 22; but I have found them and know for a certainty that they are correct...checked and double checked. Even a lay person, given all the facts, can see this was a bad product, even for it's intended use. www.blessinghouse.com/inipol/pages/run.htm

Margaret H.
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Valdez, AK 99686

1-888-853-5333

James G. (Jim) King
1700 Branta Road
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"ARLIS' staff literally saved the collections from extinction," the Library Institute's Martin said in a statement. "In the process, ARLIS became the single largest source of Alaska resources information. ARLIS' knowledgeable staff facilitates wise development and conservation in Alaska by providing unbiased and universal access to information for scientists and the public," he added.

Since ARLIS opened in 1997, the library has focused on making available to the Alaska scientific community and the public a vast storehouse of information, including a circulating collection of animal skulls, skins and mounted birds. ARLIS also offers books, technical reports, journals, maps, videos and photographs.

The library operates with team-based management. In addition to Tileston from U.S. Fish and Wildlife Service and Holba from the Exxon Valdez Oil Spill Trustee Council, ARLIS is managed by Team Librarian Julie Braund-Allen, from the University of Alaska Anchorage Environment and Natural Resources Institute; Team Librarian Tina Huffaker, from Minerals Management Service; Collection Development Coordinator Celia Rozen, from the Alaska Department of Fish and Game; and Budget Coordinator Cathy Vitale, from the Bureau of Land Management.

Holba said ARLIS is unique. "You have consortium arrangements between libraries, but there's nothing like us out there," she said. "We actually consolidated nine collections into one building."

Though ARLIS functions as one organization, its librarians still work for their respective agencies, which have different holidays and different operating procedures. The library's $1.5 million annual budget also is funded by different sources with different fiscal years.

In addition to its member agencies, the library serves a diverse audience, including educators, other federal and state agencies and the general public. ARLIS, for example, serves as UAA's science library, Holba said.

In fiscal 2002, ARLIS recorded 20,000 visitors and 13,000-15,000 reference requests. It also processed 15,000 interlibrary loans.

Putting it all together is very challenging and requires lots of paperwork and coordination.

Add to that growing budgetary constraints.

Holba cited a recent major rent increase at ARLIS' quarters at 3150 C Street. To make ends meet, ARLIS' publications budget took a $30,000 hit, she said.

"While we can't spend glory, the publicity from the award will hopefully call attention to our budget plight and ultimately bring about some relief," Holba said.

Meanwhile, the library is making do, but needs additional funds to catalog a huge backlog of donated collections to enable patrons to use them, the librarians say.

ARLIS' staff is hoping to gain legislative authority to bring in funds from other sources to pay for the cataloguing and other needs.

"We just need more partners," Tileston said. "This is one of those instances where throwing money at the problem would fix it."

Cherri Womac

From: realhelp@alaska.net

Sent: Saturday, October 19, 2002 11:35 AM

To: molly_mccammon@oilspill.state.ak.us

Cc: katharine_miller@oilspill.state.ak.us; debbie_hennigh@oilspill.state.ak.us; bob_walker@oilspill.state.ak.us; sandra_schubert@oilspill.state.ak.us; phil_mundy@oilspill.state.ak.us; restoration@oilspill.state.ak.us

Subject: opinion-herring decline; worker health needs

Dear Molly McCammon,

There is a theory not explored about the 1993 herring that were bleeding through their scales and couldn't swim straight. At the time, & even still, there is extreme secrecy about what the inipol EAP 22 bioremediation chemicals contained (EPA won't tell you, by the way) ... a very strong dose of **2-butoxyethanol that causes blood, skin, liver, kidney damage, central nervous system damage**, etc.

Also, at levels of the waters that were below 4 C no biodegrading takes place. So had the herring's fat tissues been autopsied for the chemicals in inipol EAP 22... especially 2-butoxyethanol? Maybe they swam through these chemicals & were affected by them? Why not check the Steller sea lion population for a similar fat biopsy?

ALSO, so sad to see Exxon giving away 13 million to National Victims of Crime fund when they have caused extreme health damage to all workers of the bioremediation who used inipol EAP 22. It would be miraculous if any worker did not have hemolytic anemia (body's premature destruction of its own red blood cells) Find the workers... who have no idea the seriousness of their health... & you will find the truth. Records now cannot be found, most likely. Exxon will not give a worker his own blood testing that they did.

Of course **inipol EAP 22** was an Exxon product with MSDS by Exxon, 2 days after EPA approved the experimental fiasco of inipol EAP 22. Without the 'dry cleaning' solvent... would the beaches have looked so good? I think not. More young men, now in their 30s would have their health & life.

So why don't you study the health issue of workers?
... & don't forget those on the boats and the longshoremen, too. They are also affected as are non-workers who came by at the wrong time. If you wish to know what I'm learning: www.blessinghouse.com/inipol and please be aware, it was very difficult to find all the ingredients of inipol EAP 22; but I have found them and know for a certainty that they are correct...checked and double checked. Even a lay person, given all the facts, can see this was a bad product, even for it's intended use. www.blessinghouse.com/inipol/pages/run.htm

Margaret H.
PO Box 233
Valdez, AK 99686

1-888-853-5333

From the Executive Director's Desk

Monica Riedel, Executive Director

In August I was invited to deliver a presentation to the Inuit Circumpolar Conference held in Kuujjuaq, Nunavik, Canada. In my capacity as Vice Chair of the Indigenous Peoples Council for Marine Mammals (IPCoMM), I was asked to talk about trade barriers and the Marine Mammal Protection Act. My comments included how Alaska Natives view the MMPA. The Native Exemption in the MMPA is the only piece of legislation that protects the subsistence lifestyle of our people. We support education of the environmental communities so that they will be more aware of our sustainable and non-wasteful practices when hunting marine mammals. I showed a short video on our work with the JASON PROJECT and harbor seal biosampling as means to educate millions of students via the Internet and I encouraged further work between IPCoMM and the ICC Task Force on Trade.

In September I spent a week in Washington DC on an IPCoMM/AFN delegation to address the upcoming MMPA reauthorization. Alaska Native marine mammal commissions still support amending the MMPA to strengthen co-management, provide management before depletion, change Alaska Native Organizations to Tribally Authorized Organizations, share enforcement authority, continue funding, and clarify cultural exchange and export regulations. There is much more work that needs to be done here. My appreciation is extended to Kawarek Inc. for their support and Charles Johnson, Lianna Jack, and Sky Starkey for making that trip.

Current and upcoming issues include a NMFS/ANHSC Co-Management Committee meeting in Juneau Oct 28th. Issues that will be discussed are the Federal Register Notice about new genetics data, declining PWS harbor seals, and reviewing the co-management agreement and action plans. Also, we will be preparing for the NMFS Scientific Review Meeting on November 4-5 in Anchorage where harbor seal stock boundaries will be discussed again.

On Oct. 21, ANHSC staff, M Riedel, Rex Snyder and Dr Vanek will present our Harbor Seal Programs to the AFN Youth Elders Conference.

On Nov 13-15, ANHSC will sponsor a Vessel Disturbance Workshop in Yakutat.

On Jan 4-7, 2003 the ANHSC Executive Committee will attend a "Users Knowledge and Science Knowledge in Management Decision Making" Conference sponsored by the North Atlantic Marine Mammal Commission in Reykjavik, Iceland.

Harvest Data Workshop at the Tamamta Katurlluta Gathering in August. Can you see a few door-prizes being held or worn?

Homer Workshops

August, 2002

Monica Riedel, Lillian Elvsaas, and Rex Snyder gave demonstrations and presentations on both Biosampling and Harvest Data. Coinciding with the Tamamta Katurlluta Gathering in Homer, the two workshops were well received.

Highlighting the Biosampling demonstration included the participation of audience members in filling out forms and taking samples. The highlights of the Harvest Data workshop were youth involvement and a drawing for several door-prizes (what fun!).

Board Profile: *Dan Alex*

Daniel Alex is a Denaina Indian, born in Eklutna, Alaska. Dan graduated from Anchorage West High School. Later graduating from Alaska Methodist University with a B.A. majoring in Math and Physics, Dan worked for the U.S. Naval Oceanographic Office as a Geophysicist. Dan returned to Alaska in 1973 to run Eklutna, Incorporated and did so successfully for a number of years.

Dan was involved with Native issues right from the start upon returning to Alaska. Dan was invited to participate with the Alaska Native Land Managers Association and took over as President in 1975 until the organization folded because of politics. During that time period, Dan worked on many land and Native issues. Dan was appointed to be the Spokesperson at the Congressional Oversight Hearing before Congressman John Seiberling in the U.S. House of Representatives in August of 1977.

Because of the win in Calista vs. Kleppe and because the congress was willing to make amendments to the Alaska Native Claims Settlement Act there was an opportunity to make some changes to the law. The Native titles were part of the Alaska National Interest Conservation Act of 1980.

Dan was appointed by President Reagan to serve on the Presidential Commission on Indian Reservation Economies. The focus of the Commission was to study Native American economic issues and make recommendations to change the way Native Americans were treated.

Dan is a Board member of the Alaska Native Harbor Seal Commission and a member of the Co Management team.

Team Profile: *Dr. Brendan Kelly*

Dr. Brendan Kelly, Associate Professor of Marine Biology at the University of Alaska Southeast, advises the ANHSC on scientific matters. Presently, he is preparing for the October Co-management Committee meeting which will include important discussions of stock boundaries for harbor seals in Alaska. He also is assisting Ray Sensmeier and a post-doctoral fellow in his laboratory, Dr. Karen Blejwas, in organizing a workshop on vessel disturbance of harbor seals. Several organizations, including the National Park Service, the U. S. Forest Service, the National Marine Mammal Laboratory (NMFS), the Alaska Department of Fish and Game, the Alaska Sealife Center, and the University of Alaska Southeast, are involved in studies of vessel disturbance of seals in glacial fjords. The November workshop is aimed at coordinating the design, collection, and analysis of data from those different studies.

In January 2003, Dr. Kelly will begin new duties as Dean of Arts and Sciences at the University of Alaska Southeast. He will continue to devote 2-3 months each year to research and advising the ANHSC.

We have a new website!

www.harborsealcommission.org

Great appreciation is given to UAA media design student, Alexis Reynertson. With her cooperation we have a wonderful website and she received highest marks for her class on web design. As a patient and insightful person, it did not take Alexis long to input all the information and designs for ANHSC.

As a new website, we will begin making updates this fall. We welcome any stories or photos you may want to share with other readers. Please call ANHSC staff for information at 1-888-424-5882, or e-mail at rexsnyder@gci.net.

Preliminary Harvest Information***

***During 2001, the estimated subsistence take of harbor seals by Alaska Natives was 2,024 seals, with a 95 percent confidence range of between 1,637 to 2,604 seals. Of the take, 11.6 percent (234 seals) were struck and lost and 88.4 percent (1,790 seals) were harvested. The 2001 take of harbor seals came from the following stocks: Southeast Alaska stock (1,176 seals), Gulf of Alaska stock (764 seals), and Bering Sea stock (84 seals). Harbor seals were taken in 53 of 62 surveyed communities. Hunters reported taking males over females by about 2.4 to 1, and adults (71.8 percent) over juveniles (19.5 percent) or pups (0.2 percent). The 2001 take of harbor seals was the lowest recorded since 1992 -- 2,854 (1992), 2,736 (1993), 2,621 (1994), 2,742 (1995), 2,741 (1996), 2,546 (1997), 2,597 (1998), 2,229 (2000), and 2,024 (2001). Reasons for declining harbor seal harvests are uncertain, but appear to be associated with decreasing numbers of seal hunters.

****(From draft version of the 2001 ADF&G, Subsistence Div. Technical Paper 273. Official publication of results will be available soon for those seeking final accepted numbers)*

Biosampling Events

Upcoming Events

Co-Management Committee Meeting Oct. 28 in Juneau

Board Meeting November 13-15 in Yakutat

Biosampling Training end Nov/beg Dec in Anchorage

IPCoMM Meets Dec. 12-13 in Anchorage

Biosampling training often involves youth while sharing both traditional values and scientific protocol. Left Photo: Nick Tanape participating at the Tamamta Katurlluta Gathering in Homer in August. Right Photo: John Boone (Valdez) and his son Koshka during the JASON Project in January. **Interested in becoming a biosampler? Give us a call.**

Current Board of Directors and Members:

Harold Martin, Southeast Region, Chair
Mitch Simeonoff, Kodiak Region, Vice-Chair
Lillian Elvasaas, Cook Inlet Region, Secretary
Arlene Gunderson, Aleutian Pribilofs Region
Ralph Andersen, Bristol Bay Region
Walter Meganack Jr., Chugach Region
Dan Alex, Cook Inlet MMC
Vicki Vanek, DVM, ADF&G Biologist
Dr. Brendan Kelly, Contract Biologist

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E-mail: monicariedel@gci.net

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Ge'lta'k (Eyak for Harbor Seal)

Alaska Native Harbor Seal Commission

Volume 2, Issue 1 **Newsletter** October 2002

Mission Statement

"To ensure that harbor seals remain an essential cultural, spiritual and nutritional element of our traditional way of life. And, to promote the health of harbor seals in order to carry forward the cultural, nutritional and Spiritual traditions of Alaska Natives."

This revised mission statement was developed last year by the Board and Staff of ANHSC during a retreat in Girdwood, Alaska. The purpose of the retreat was to revisit and refocus on the purposes, goals, and objectives of the Commission and develop a well defined strategic plan to achieve the mission.

...a Message from Harold Martin

Chairman of Board, ANHSC

This past year has been challenging but very exciting. Unanticipated Funds from Congress imposed many new responsibilities upon the Commission. Fortunately, we have a Board and Staff that are very professional and highly successful towards addressing new challenges. We have established a great working relationship with the Alaska Department of Fish and Game Subsistence Division and the Division of Wildlife Conservation, the National Marine Fisheries Service, as well as other federal and state agencies and coastal Native communities who are members of the Commission.

We negotiated a cooperative agreement with the State Subsistence Division to work on Subsistence Harbor Seal research in the areas of Harvest Assessment, and thanks to a co-management committee who is charged with developing an action plan for each year, our co-management agreement with the National Marine Fisheries Service is proving successful.

For 2001/2002 we were involved in population monitoring, harvest management, education, and other research recommendations. The above projects entail many details which we don't have the space to list here. Our bio-sampling program extends from Southeast to Bristol Bay and our youth area watch program continues to grow.

We have expanded our staff by hiring Mr. Rex Snyder as our research coordinator. Having recently received his B.A. degree from UAF in Rural Development with an emphasis on natural resource management, he is proving to be a valuable asset to the Commission.

Modern day Natives are educated and our organizations are very sophisticated. I have stated many times that Natives can do anything as well as any state or federal agency in the areas of research administration. The Alaska Native Harbor Seal Commission is living proof of this and we will continue working and expanding on our goal to strengthen and increase the role of Alaska Natives in the development of Management Plans, Resource Policies, and decisions affecting Harbor Seals and their customary and traditional uses.

Having our spring and fall meetings in alternating communities has worked well and the Commission is open to invitations from communities. I look forward to new challenges and another successful year. My continued appreciation to our Board, Staff, ADF&G, NMFS and all others that work with us.

MARINE ADVISORY PROGRAM

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October 29, 2002 DRAFT .. Discussion Paper

Prince William Sound Herring Fishery Buyback

EVOS Restoration Project Proposal

Rick Steiner, University of Alaska Marine Advisory Program < afrgs@uaa.alaska.edu >

Today, more than 13 years after the 1989 Exxon Valdez Oil Spill (EVOS), government agencies list only 1/4 of the species and resources injured by the spill as fully recovered. And at their August 6, 2002 meeting, the EVOS Trustee Council downgraded the recovery status of Pacific herring from the "Recovering" category to "Not Recovering" - the first such down-listing for any of the injured species since the spill first occurred. As stated by the EVOS Trustee Council: "in 1993 there was an unprecedented crash of the adult herring population" in Prince William Sound (PWS). The outbreak of viral hemorrhagic septicemia (VHS) disease and a fungus in the PWS herring population, which is thought to have resulted from depressed immune response, occurred in 1993, with no matching outbreak elsewhere in Alaska. Subsequently, the PWS herring population has not recruited a successful year class, thus justifying their recent down-listing in recovery status. As herring are important prey for many marine mammals, seabirds, and fish in the ecosystem, the status of the herring population is problematic to the recovery of other injured species. Many scientists now feel that, certainly from an ecological and perhaps even from a future economic standpoint, herring are more valuable in the water rather than being harvested. From an ecological standpoint, the harbor seals, sea lions, killer whales, humpback whales, seabirds, salmon, and other fish in the PWS ecosystem would benefit by having access to as much herring as the system can produce. Thus it would likely be in the highest and best interest of the ecological recovery of PWS to forego any further removals of herring from the system.

Thus for discussion purposes as a potential EVOS Restoration project, it is proposed here that the government purchase and retire - "buyback" - all PWS commercial herring fishing permits. - approximately 106 sac roe seine permits, 24 gillnet permits, 128 herring pound permits. There are also individuals who have historically participated in the non-limited-entry wild roe-on-kelp fishery, and a handful of potential bait seine operators. The market value of the limited entry permits has plummeted due to the herring stock collapse and poor market conditions, and they are likely to remain low into the foreseeable future. To reduce the risk of overfishing this vulnerable stock, the Board of Fisheries in 1994 raised the minimum biomass threshold necessary to conduct a fishery in PWS, from 8,400 tons to 22,000 tons.

The 22,000 tons level is assumed by ADFG to be approximately 25% of the unfished stock, meaning an unfished herring stock in PWS could be 88,000 tons or more. The present PWS Herring Management Plan allocates harvests from the 22,000 - 42,500 tons of total biomass at up to 20%, and for a biomass over 42,500 a harvest of 20%. It must be emphasized here that the BOF allocation is based on assumptions regarding harvest impacts on individual stock dynamics - not consideration for additional needs for herring by many other species in the PWS ecosystem. For instance, even though the herring stock itself may withstand a 10,000 ton commercial fishery harvest from a 50,000 ton total biomass, it is possible that such a removal would further compromise and/or delay the recovery of other injured species in PWS. From a Restoration perspective, any further removal of herring could compromise the recovery of the ecosystem as a whole, and should therefor be avoided to the extent possible. And although the same objective could be accomplished by dictate of the Board of Fisheries raising the minimum biomass threshold to say 100,000 tons, without compensation to the existing permit holders this would be an unfair resolution. It must be underscored here that the PWS herring crash is an extraordinary situation brought about in part by the Exxon Valdez Oil Spill, and it is entirely reasonable that the EVOS Trustees Council invest some of its funds in this endeavor. And from a research and fishery management perspective, having an unexploited herring stock would offer unprecedented scientific opportunities over the coming decades. It is probable that, as a result of prohibiting removal of herring from PWS, we would see profound positive responses throughout the ecosystem over the coming decades.

As with other fishery "buyback" programs, the PWS herring fishery buyback would have to be applied on an "all-or-none" basis - that is, if this program is to be enacted, participation would have to be mandatory, not optional. To fairly accomplish this buyback, it is proposed here that permit holders be compensated at higher than current market value for their permits. For instance, at pre-spill values, the seine permits were worth from $150,000 - $180,000, gillnet permits were about $75,000, and pound permits were about $40,000 - a total permit value for PWS of about $23 million. Today, the same permits are collectively valued at only about $4 million. Any compensation must be fair, and thus would probably fall somewhere between these two numbers. The ultimate cost should be calculated with rigorous econometric models, and set at levels considered fair by all involved. For discussion purposes, it is proposed here that compensation - in order to fairly compensate permit holders for lost future potential earnings from the fishery, if any, they may be foregoing - be set between 50% - 75% of pre-spill permit value. At the upper end of these numbers, the total cost to retire the PWS limited entry herring permits would be about $17.25 million. In addition, compensation would be appropriate for those with historic participation in the wild roe-on-kelp and bait seine harvest. For discussion purposes, this may be worth approximately $2 - $3 million, bringing the total harvester retirement cost to about $20 million. Additionally, local communities and seafood processors of PWS that would be foregoing fish tax and other potential economic benefits derived from a future herring fishery were one to occur, may deserve compensation - perhaps a total of $5 million - $10 million. Thus, it is suggested here that the total cost to the government to permanently retire the PWS herring fishery would be on the order of $25 million - $30 million (or correspondingly less if a lower permit value is used).

As the EVOS *Reopener for Unknown Injury* allows the governments presently to collect up to an additional $100 million from Exxon for unanticipated injury, this would be a logical source for funds to support this restoration project (as the collapse of PWS herring is considered by many as an unanticipated injury). In lieu of this source, the $180 million EVOS Restoration Reserve should be drawn-down accordingly to provide the monies necessary.

Additionally, the Gulf Ecosystem Monitoring (GEM) Program, currently supported by the Restoration Reserve, should allocate monies annually to study and monitor the recovery of this unfished PWS herring stock and other dependent species within the ecosystem. The unfished PWS herring stock would provide an unprecedented scientific control from which to better understand herring population dynamics throughout their range, leading to a potential for improvement in herring fishery management across the Pacific. This is one of the single most important restoration actions left to be taken to assist in the recovery of the marine ecosystem injured by the 1989 Exxon Valdez Oil Spill.

I respectfully request that the EVOS Trustee Council staff and scientists evaluate this conceptual proposal - including conducting an ecological modeling exercise to elucidate how such an initiative might manifest in the recovery of the ecosystem over time - and then recommend to the council how and whether to proceed with the project. In this deliberation, it is recommended that all stakeholders in the issue be consulted, including permit holders, processors, local communities, scientists, and others as appropriate.

MARINE ADVISORY PROGRAM

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October 31, 2002

Molly McCammon, Executive Director
Exxon Valdez Oil Spill Trustee Council

via fax: 276-7178

Dear Molly,

Thanks for the opportunity to briefly present the Prince William Sound Herring Buyback proposal during public comment at the Trustee Council meeting 10/29/02.

From your comments in the Anchorage Daily News this morning, it is apparent that there is some misunderstanding regarding the intent of the proposal. I want to be very clear that this concept is based solely on ecological - not economic - rationale. Apparently, I didn't explain the concept adequately either verbally or in the written document. This isn't an economic fleet capacity reduction or fishery rationalization proposal.

On the contrary, the proposal is simply to leave all of the herring in the marine ecosystem for the many other species that depend on them. From a restoration perspective, this seems an appropriate thing to do, particularly for the many injured populations still struggling to recover from oil spill injury that depend on herring. Also, as a spill mitigation measure, it would obviously enhance the overall biological productivity of the ecosystem.

Further, this proposal is substantially similar to the Council's expenditure of monies paid to private landowners and timber companies to retire timber harvesting rights in perpetuity to protect habitat in the interest of Restoration - something you (and I) strongly endorse. In that case, the expenditure of several hundred million dollars was intended to remove future stressors to the coastal ecosystem (including intertidal herring spawning habitat). In the case of the herring fishery buyback, the governments would simply be paying money to retire another stressor on the marine ecosystem - the removal of substantial amounts of critical prey.

Please let me know if I can help further clarify the intent of the proposal. I would appreciate it if you could forward this short clarification along to the Council as well. I trust that the Council will give the proposal the serious consideration it clearly deserves. This is perhaps the most direct, positive mitigation you can accomplish in the ecosystem over the long-term.

Sincerely,

Rick Steiner

Subject: herring
Date: Thu, 31 Oct 2002 15:49:17 -0800
From: "Andrew Trites" <trites@zoology.ubc.ca>
To: <AFRGS@uaa.alaska.edu>

Hi Rick,

I read your comments in the newspaper and think that your suggestion is a good one and would make an interesting experiment. I suspect that leaving more herring in Prince William Sound would go along ways to restoring numbers of marine mammals and sea birds.

Andrew W. Trites, Ph.D., Research Director
North Pacific Universities Marine Mammal Research Consortium
Fisheries Centre, University of British Columbia
Room 18, Hut B-3, 6248 Biological Sciences Road
2204 Main Mall, Vancouver, B.C. Canada V6T 1Z4

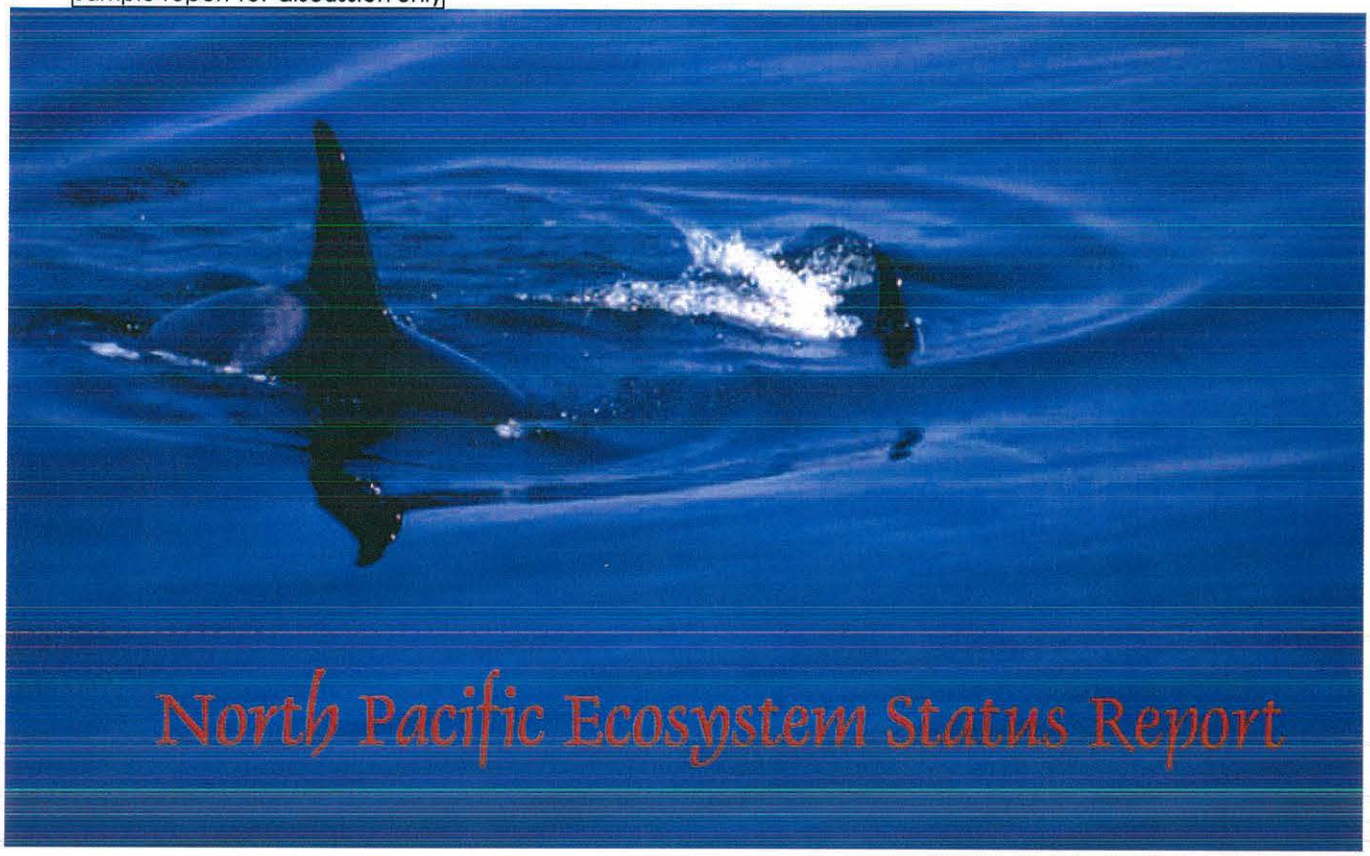
Phone: (604) 822-8181, Fax (604) 822-8180
Web Site: http://www.marinemammal.org
E-mail: trites@zoology.ubc.ca

TO: Molly McCammon

FR: Rick Steiner

RE: fyi — could you append this to the note I just sent to forward to the Council? — thanks.

Sample report for discussion only

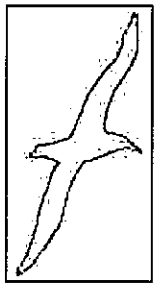


North Pacific Ecosystem Status Report

North Pacific Marine Science Organization
2003

Sample report for discussion only

North Pacific Ecosystem Status Report



Hyung-Tack Huh
Chairman, PICES

R. Ian Perry
Chairman, Science Board

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A.P. Sloan/Census of Marine Life (U.S.A.)

December 2003
Sidney, British Columbia, Canada

Sample report for discussion only

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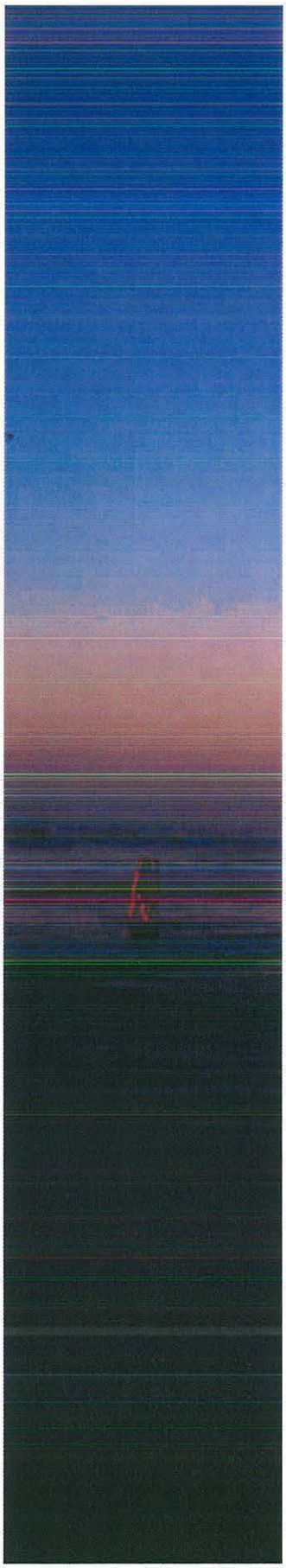


Sample report for discussion only

Synthesis

Under construction

Sample report for discussion only

Ocean/Climate

Pacific Decadal Oscillation

Scientists have been exploring how the atmosphere and the ocean interact in the Pacific Ocean. The El Niño phenomenon is the most famous example. Their interactions create a large region of warm surface water in the eastern tropical Pacific Ocean west of Peru; with often dramatic effects on the world's climate. A relatively new discovery is that the surface waters of the North Pacific Ocean shift between warm and cool states about every 30 years or so. When the western and central North Pacific is warm, the coast of the Gulf of Alaska is cool and *vice versa*.

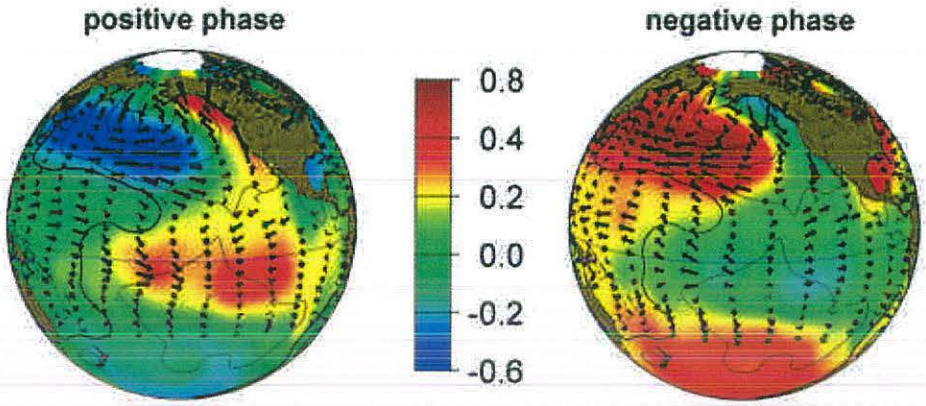


Figure 1 Two states of sea surface temperature in the Pacific Ocean. Colours indicate average temperature (°C) above and below average. Arrows indicate average winds[i].

The Pacific Decadal Oscillation Index (PDO) is a measure the state of the North Pacific sea surface. Positive values indicate warming along the North American continent and cooling in the central and western Pacific. Negative values indicate the opposite. Following the 1997/98 El Niño, the PDO index went strongly negative but increased to slightly positive values by mid 2002. While the index may vary slightly from year to year, its major characteristic is the persistence in one or the other state of nature that have become known as climate "regimes".

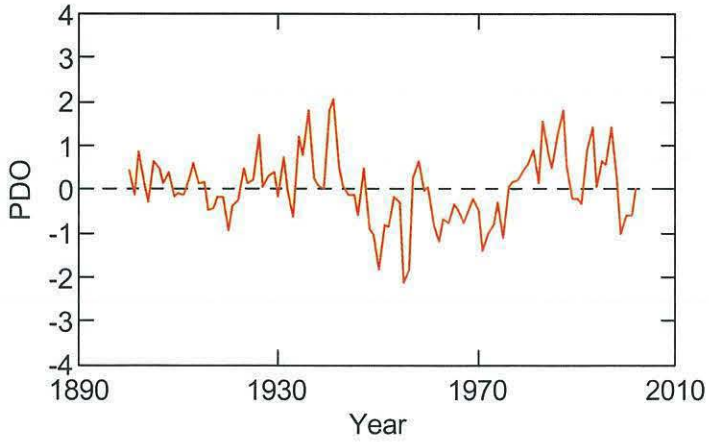
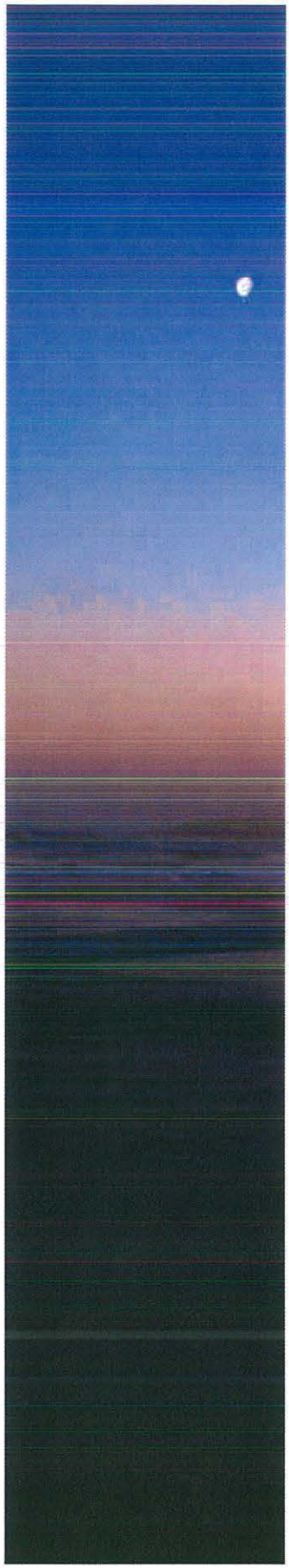


Figure 2 Trend of PDO Index from 1900 to August 2002.



North Pacific Index[ii]

The atmospheric pressure over the North Pacific Ocean varies daily, seasonally, annually, and decadally. High pressure typically brings sunny dry weather and low pressure brings storms and rain. The intensity and distribution of these air pressure patterns around the North Pacific Ocean affects regional weather and ecosystems. Two features predominate in the North Pacific, a low pressure region centered over the Aleutian archipelago in the north and a high pressure region in the south. The North Pacific (NP) Index is the area-weighted pressure of the atmosphere at the sea surface over the region 30°N to 65°N, 160°E to 140°W, roughly the region of the Aleutian Low Pressure system. It has its greatest influence in fall and winter when storms are generally most intense. Lower values of the NP index indicate lower average air pressure and greater storminess. The trend throughout the last century is similar to that of the PDO with interannual variability but also persistent regime-like patterns.

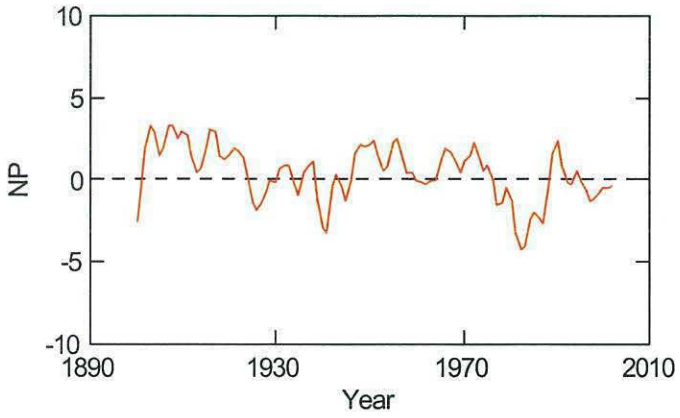
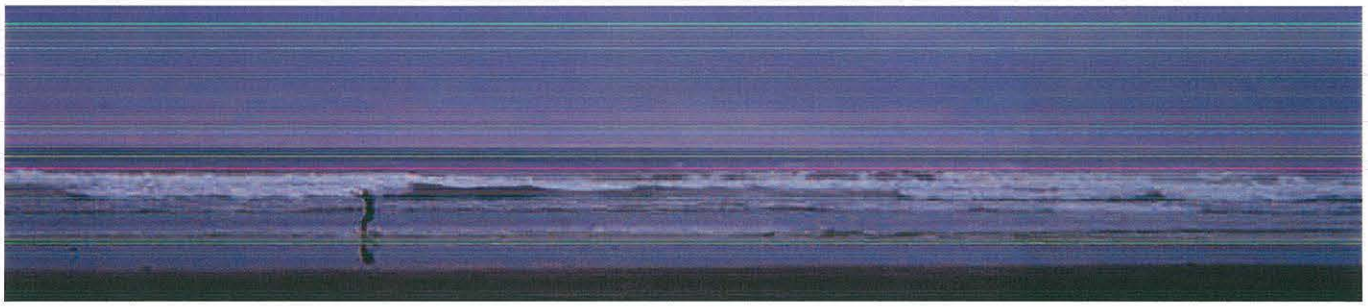


Figure 3 Trend of the November to March NP index from 1900 to 2002. Negative values indicate winters of lower than average air pressure over the North Pacific Ocean, generally warmer winters in the northeastern Pacific and colder in the western Pacific[iii].



Southern Oscillation Index

The Southern Oscillation Index reflects the large-scale atmospheric pressure differences between Tahiti and Darwin, Australia. Strong and persistent negative values are indicative of El Niño events. These are typically accompanied by easterly trade winds and elevated sea temperatures off the coast of western South America. Strong negative values are accompanied by westerly trade winds, cooler ocean temperatures along the eastern tropical Pacific and warmer waters in the western tropical Pacific. This ocean/atmosphere system has a major influence on the global climate and marine ecosystems in the Pacific Ocean. In 1999, the tropical Pacific swung from a strong El Niño in 1997/98 to a strong La Niña in 1999. This dramatic reversal was accompanied by a similar shift in the PDO. In recent months the SOI has tended back toward El Niño but the PDO has persisted at intermediate values.

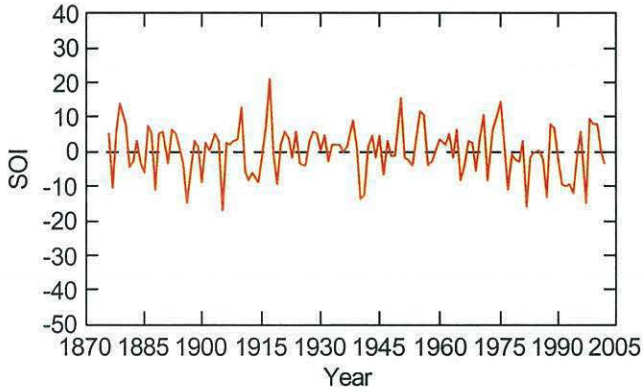


Figure 4 Trend in Southern Oscillation Index [iv].

Sample report for discussion only

Arctic Oscillation Index[v]

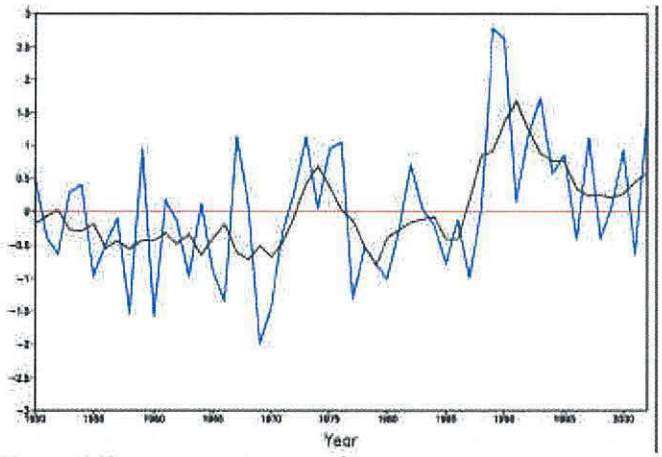


Figure 5 The seasonal mean AO index during cold season (blue line) is constructed by averaging the daily AO index for January, February and March for each year. The black line denotes a five-year running mean of the index. The index is normalized using 1950-2000[v]

The Arctic Oscillation is an index of the dominant spatial pattern of sea level air pressure in the cold months in the northern hemisphere. The shift from low values of the index before 1990 to recent higher values indicates reduced sea level air pressure over the Arctic and increased sea level air pressure in the subtropical latitudes. The timing of the change from generally negative to positive values corresponds to the ecosystem changes in the North Pacific in 1989[vivii]

Atmospheric Forcing Index

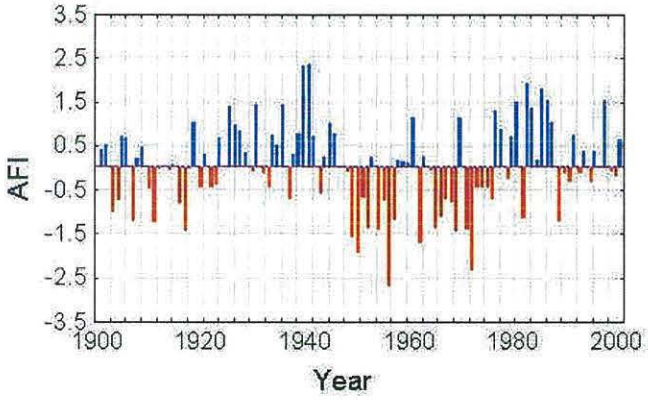


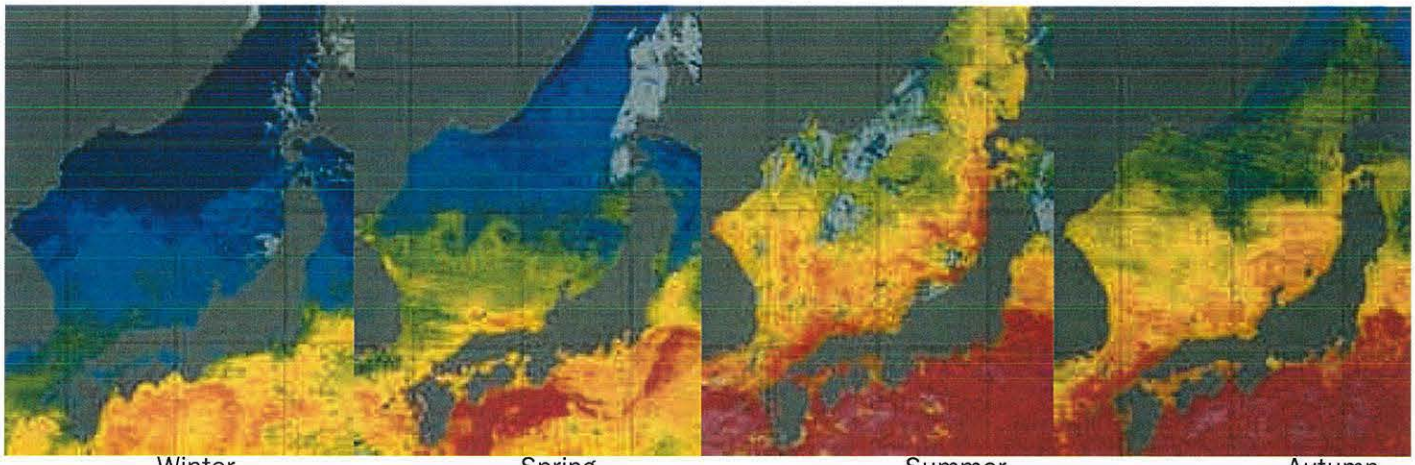
Figure 5 Atmospheric Forcing Index combines the Aleutian Low Pressure Index (ALPI), Pacific Interdecadal Oscillation Index and the northwesterly atmospheric circulation anomalies for the North Pacific (December through March)[vii].

The Atmospheric Forcing Index utilizes standardized scores of the first component from a principal components analysis on the Aleutian Low Pressure Index (ALPI), Pacific Interdecadal Oscillation Index and the northwesterly atmospheric circulation anomalies for the North Pacific (December through March). Positive values represent intense Aleutian lows, above average frequency of westerly and southwesterly winds, cooling of sea surface temperatures in the central North Pacific, and warming within North American coastal waters.

Regional Chapters

Sample report for discussion only

Japan/East Sea



Winter Spring Summer Autumn

Seasonal Temperature Changes in 1993

Background

The Japan/East Sea[1] (JES) is formed by the separation of the Asian mainland on the west and the archipelago of Japan on the east. It spans the latitudinal range from 35°N to 50°N, about the same latitude as Point Conception, California to Vancouver Island, B.C. on the North American side. The coastal states include Russia, North Korea, South Korea from north to south on the mainland and Japan. The Japan/East Sea has several deep basins and is connected with the North Pacific Ocean by shallow and narrow straits at the northern and southern extremes. The major influences include the inflow of warm salty water from the south meeting cool fresher water from the north. The interface between the two is dynamic. Surface ocean currents tend to be northward along the coast of Japan, some water flowing out to the North Pacific through the Tsugaru Strait between the Japanese islands of Hokkaido and Honshu and the La Perouse (Soya) and Tartarsky (Mamiya) straits further north. Locations have multiple names because of the different languages in the region[viii]. Ocean currents on the western side tend to be southward, creating an overall anticlockwise (cyclonic) surface circulation pattern. Deep waters are very cold because of severe winters that create dense, cold water that sinks.

Highlights

The JES has one of the clearest, most unambiguous signals of long-term ecosystem change, yet there is no good answer for why?

Although Pacific sardine once accounted for over 70% of the catch of pelagic species in the JES,[ix] they no longer form a significant fraction of the catch.

The winter distribution of Stellar sea lion has moved southward along the west coast of Hokkaido resulting in increasing interactions between fishermen and the sea lions.

Critical factors causing change

Climate

Strong winter winds associated with cold-air outbreaks from Siberia cause large-scale changes at the ocean surface which have significant effects on the JES. The winter of 2000/2001 was anomalously harsh in this regard.

Status and Trends

Physics and climate

There is mounting evidence that the annual mean temperature of the mixed layer is increasing over large portions of the world ocean[x], although little is known about the long-term behaviour of subsurface

[1] PICES calls this body of water the Japan/East Sea, in consideration of its translation to English from multiple languages in the region.

temperature and salinity in most of the world ocean. For the Japan/East Sea, the nature of changes in the physical state of the JES, as manifested by changes in temperature, is somewhat clearer. Good quality observations at all depths have been collected by the countries bordering the JES since the early 1900s, making the task of examining changes in the JES somewhat more straightforward than for the global ocean.

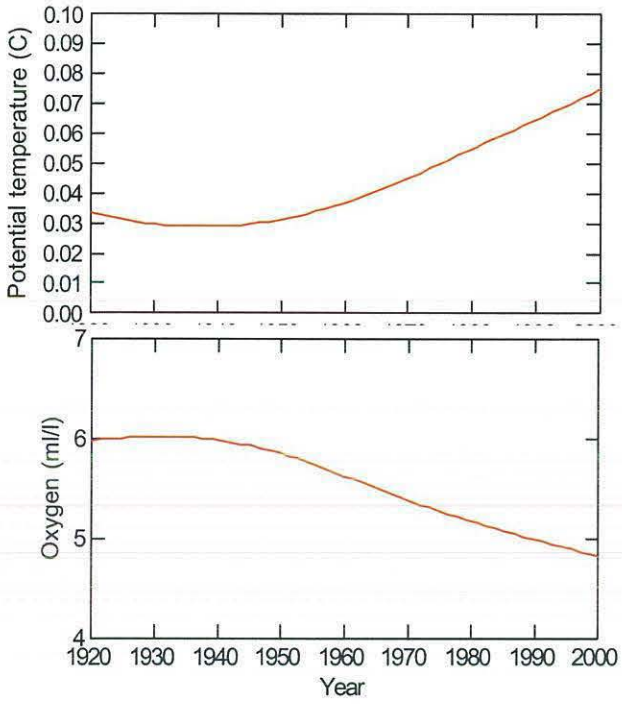


Figure 6 Trends in potential temperature and oxygen at 2500 m depth from 1930 to 1995 averaged over the Japan/East Sea[xi].

Despite considerable variability, it is clear that temperatures in the deeper portions of the JES have been increasing nearly monotonically in the long-term over sizable portions of the JES since the 1930s[xii,xiii]. In some locations, this trend can be seen at depths as shallow as only 250m beneath the surface. In surface waters, the pattern is different. At least in the southern JES, the decadal-scale SST patterns appear to correspond to the path followed by the Kuroshio. The timing of the sudden and persistent decline in SST in the JES in 1963[xiv] corresponds to an equivalently sudden and persistent shoreward shift in the Kuroshio axis in 1963[xv]. Likewise, the sudden and persistent upward shift in water density (sigma *t*) at Station 5 on the PM-line corresponds to a dramatic and persistent offshore shift in the Kuroshio axis in the same year. SST observations in the JES are correlated with those observed in the East China Sea, which in turn is reflected in the path taken by the Kuroshio[xv].

As salinity has been difficult to measure with sufficient accuracy, it is considerably more difficult, if not impossible, to discern trends from these data over similar timescales. Over the last century, air temperatures have been significantly warmer in winter and spring in the mid-latitude regions of the JES with the greatest rate of warming occurring in the cold season[xvi].

In waters deeper than 2000 m there is considerably more evidence of a long-term warming, which appears to be highly correlated with a decrease in oxygen concentration in deep water[xvii]. The concentration of oxygen in the deep waters has decreased by more than 1 ml l^{-1} since the 1930s and the deep potential temperature has increased by 0.5°C over the same period. Since the generally high values of dissolved oxygen in the deep waters of the JES result from wintertime convection along the western coast of the JES, a decrease in oxygen in the deep water (and the corresponding increase in potential temperature) would appear to indicate that the amount of deep convection in winter in the JES must be decreasing over time. Using a simple box model with contemporary measurements of temperature, salinity, dissolved oxygen, and CFCs (chlorofluorocarbons), it was found that by the mid 1990s, less than 1% of the surface area of the JES was subject to deep convection in wintertime[xviii], although this value must have been much higher in the 1930s to account for the high dissolved oxygen in the deep water at that time.

The fact that dissolved oxygen is decreasing in the deep layers of the JES implies that insufficient new, dense, oxygenated water is being formed at the sea surface in winter to match the rate of biological utilization of oxygen in the deep water. If this is indeed the case, then one must inquire as to the reason for the decrease in wintertime convection. A number of hypotheses have been offered including (1) and increase in wintertime air temperature over the western region, (2) a change in the paths of major atmospheric storms in winter, (3) freshening of the surface waters of the JES, (4) changes in the positions of large-scale atmospheric systems in winter over Siberia and the western subarctic Pacific, and (5) changes in the nature of the JES due to increasing human populations around its borders. Since it is now clear that there is a long-term trend of increasing temperature at all levels of the JES, it is imperative to begin to understand the cause of this change and the specific mechanisms that are driving it.

There is new *in situ* evidence that, at least in the winter of 2000-2001, deep convection occurred in the western Sea. Measurements showed unmistakable wintertime convection occurring off Vladivostok[xix,xx]. This was by far the best-documented case of wintertime convection and deep water renewal. The results suggest that deep convection has not stopped altogether, however it is impossible to estimate the areal extent of the convective region or whether it is large enough to begin to replenish the dissolved oxygen in the deep water. Again, a simple model suggests that considerable deep convection must occur over many winters for the dissolved oxygen values to increase and the potential temperature to decease back to pre-1960 levels in the deep water. Whether or not this will occur is unknown, and only sustained, high quality observations of the physical processes at all depths of the JES in wintertime in the coming years will help to understand this problem.

Chemistry

The chemical properties of water in the JES have been measured for many years. Unfortunately these properties are difficult to measure so methods and accuracy have changed over the years, making comparisons of measurements over the long term difficult to interpret. Recent measurements, however, indicate that the chemical properties of the JES are more similar to the chemical properties of the East China Sea than to other regions in the western subarctic Pacific[xxi]. This likely reflects that the major source waters, the Tsushima Current, originate in the East China Sea. In contrast, the Okhotsk Sea is another major marginal sea in the western Pacific but it is more similar to the western subarctic Pacific. The JES is exhibiting some of the classical signs of eutrophication, including increasing nutrient concentrations (perhaps from local rivers as well as the East China Sea) and reduced oxygen concentrations in deeper waters.

Sampling along the PM line in the southeastern JES by the Maizuru Marine Observatory of JMA has revealed decadal-scale variation in the JES ecosystem. From 1982 to the early 1990s, surface mixed layer phosphate concentrations were high in winter and low in spring indicating that nutrient depletion occurred earlier than before or after this period. Water density profiles indicate that water column stability was stronger during these years, suggesting that nutrient supply to the surface waters was more restricted during this period.

Plankton

Phytoplankton The basis of most biological production begins with transformation of sunlight and nutrients by phytoplankton. Throughout the winter, light levels are often too low to promote rapid increases in the abundance of phytoplankton. Although light at the ocean surface may be sufficient for growth, the deep circulation of ocean water in wintertime, caused by strong winds and cold water temperatures, takes the phytoplankton cells away from the light. Only when the sea surface temperatures warm in spring and vertical circulation is restricted to the surface layers, can phytoplankton grow and multiply. Because of their pigments (e.g. chlorophyll), the colour of the ocean is changed with increasing abundance. Since 1978, it has been possible to measure the amount of chlorophyll at the ocean surface with ocean-colour sensing satellites.

Various satellites with different sensors have been used over the years, often making it difficult to compare some results among sensors. Interference from clouds also limits the ability of satellites to measure chlorophyll, as does contamination by factors other than chlorophyll that can affect ocean colour.

Satellites cannot distinguish which species are responsible for the chlorophyll nor can they see beneath the surface. Nevertheless, some salient features of surface plankton growth are revealed. Comparing Aprils of 1998-2002, it is immediately apparent that there are both annual and spatial differences in chlorophyll distribution throughout the JES. At this time of year, there is a large region of chlorophyll minimum in the central northern JES and this feature is conspicuous in all years. The southwestern coast of Sakhalin and the Primorye coast appear to have the highest chlorophyll concentrations in all years.

Sample report for discussion only

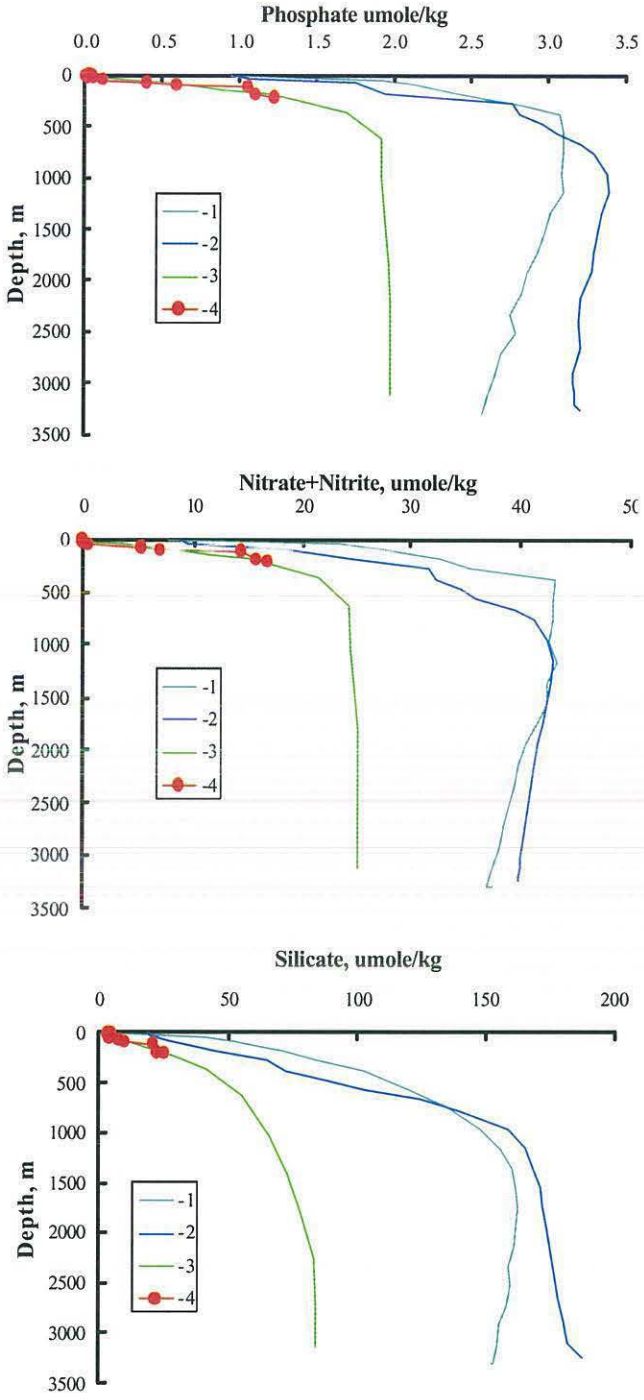


Figure 7 Concentrations of nutrients (phosphorus, nitrogen, and silicon) by depth in the East China Sea (?), Japan/East Sea (-), Sea of Okhotsk (-), and western subarctic Pacific (-)

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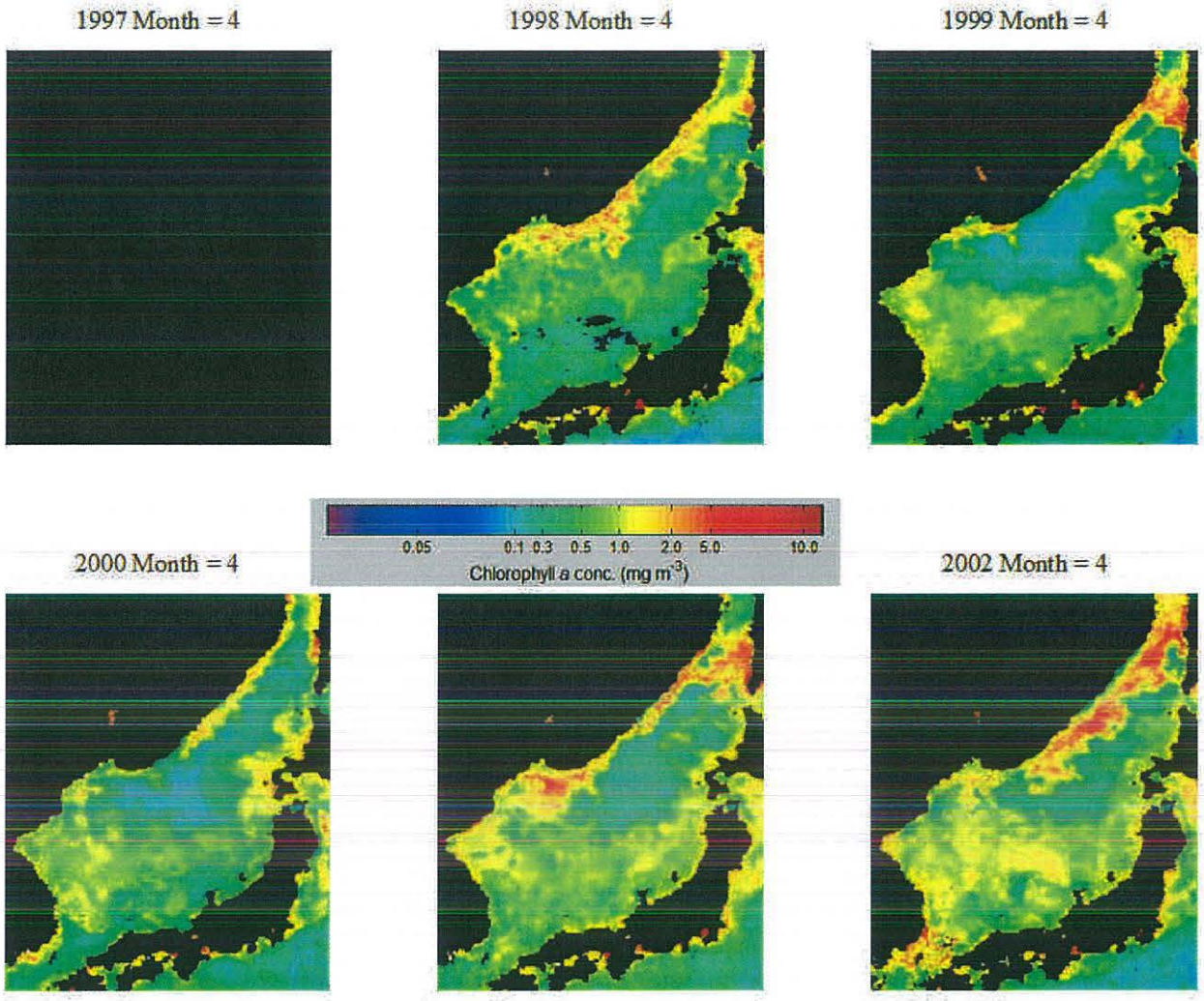

Figure 8 Spatial patterns of surface chlorophyll (mg/m^3) in the Japan/East Sea in April, 1998 to 2002[xxii]

The timing of chlorophyll blooms at the ocean surface varies seasonally and annually. The JES has both spring and fall blooms that vary in timing and magnitude. The spring bloom begins in the south and progresses northward and its timing can vary by up to 1 month. The bloom also starts along the Russian coast of Primorye and moves seaward as spring progresses. Comparing chlorophyll concentrations with JMA meteorological buoy data indicated that stratification had developed by the onset of the spring bloom. A particularly early spring bloom in 1998 occurred when winds were lower and insolation higher than in other years. The geographic pattern for the fall bloom is less regular but it occurs almost simultaneously from south to north. Melting sea ice in Mamiya (Tartar) Strait between Primorye and the west coast of Sakhalin is responsible for freshening the surface waters in the region. When combined with seasonal warming in spring, a less dense surface layer increases water column stability and allows for the development of the spring bloom in that area.

Over the short period of record described here, there is no apparent trend. Longer timeseries are available but attempts to interpret these properly are challenged because of difficulties with the precision and accuracy of colour sensors and their intercalibration.

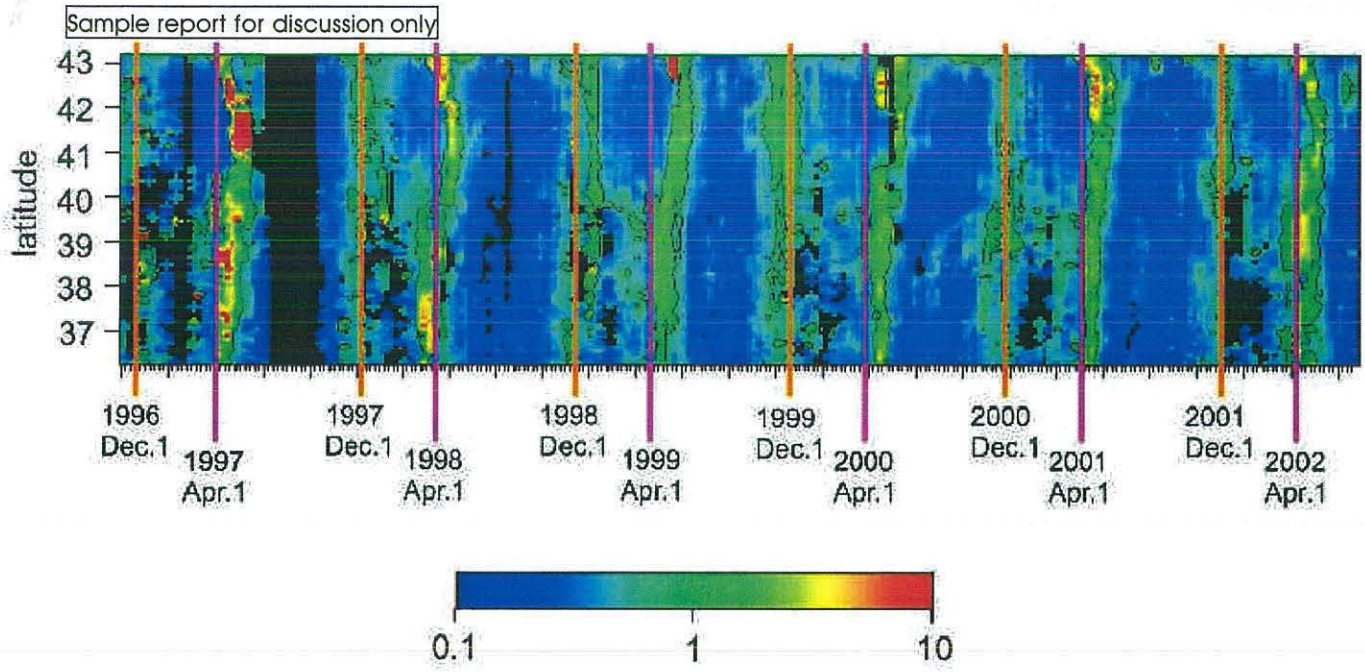

Figure 9 Time series of chlorophyll along 134° 33' E longitude from OCTS and SeaWIFS satellites. Vertical lines at fixed dates show differences in bloom timing among years. The larger peak in April 1997 may be due to differences between sensors (OCTS and SeaWiFS). A Japan Meteorological Agency buoy was located on this longitude at 37°55'N[xxiii]

Zooplankton Warm water species are present in regions of the JES that are under the influence of the Tsushima Current (a branch of the Kuroshio Current) that flows from the East China Sea into the southern JES between Korea and Japan. Subarctic species inhabit the northern JES where subarctic-origin water dominates. So the JES includes a mixture of warm and cold water species. A total of 30,098 samples were collected by vertical net hauls (0.33 mm mesh) from 150m to the surface from 1966-1990. These indicated that the average biomass in the coastal areas had minimum values in daytime sampling in winter (< 50 mg m^{-3}) and peaked in June (125 mg m^{-3}). In the offshore, the mean biomass was greatest in April (day/night: 72/147 mg m^{-3}) and lowest in winter. Day/night differences were greatest in 1976/77 and 1983/84. The highest annual mean values were associated with areas north of the subpolar front.

Although the colder regions of the JES are distinguished by higher zooplankton concentrations, there is lower species diversity. The small and medium size fractions, largely copepods and younger stages of larger species, are food for larger zooplankton and fish larvae. The larger fractions include large copepods, hyperiids, euphausiids and chaetognaths. The latter are the main zooplankton predators.

Fish and Invertebrates

Common squid (*Todarodes pacificus*), the sardine (*Sardinops melanostictus*), chub mackerel (*Scomber japonicus*), horse mackerel (*Trachurus japonicus*), anchovy (*Engraulis japonicus*), yellowtail (*Seriola quinqueradiata*), snow crab (*Chionoecetes opilio*) and walleye pollock (*Theragra chalcogramma*) are major targets for commercial fisheries in the JES. Common squid and the sardine are the most important target species, so they have been the focus of many life history and stock-assessment studies over many years.

Japanese sardine occur throughout the JES when they are abundant. Spawning grounds exist along most of the western shore of Honshu and the fishing grounds are along all coastal margins. Fishing in the north is seasonal, taking place primarily during the summer and fall, whereas fishing in the south occurs year-round. The abundance of sardines has fluctuated dramatically in the past and is currently at very low levels.

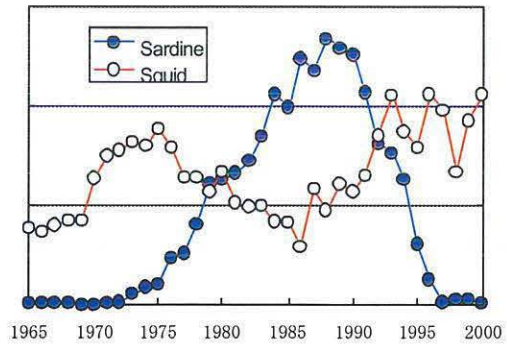

Figure 10 Total catch of common squid by Japan and Korea and Japanese sardine by Japan.

Common squid are particularly abundant around the main Japanese Islands, in both warm and cold waters. The migration routes and spawning areas of common squid in the JES vary with abundance. In autumn, common squid usually undergo a southward spawning migration. In the 1970s, adult squid usually migrated westward along the northern edge of the sub-arctic front to an area east of Korea, and then migrated southward to spawn in the East China Sea. But in the 1980s, adult squid often migrated southward to the coast of Honshu Island, crossing the sub-arctic front. In the 1990s the migration route returned to the pattern observed in the 1970s. The main countries fishing for squid in the Japan/East Sea are Japan, North Korea and South Korea. Assuming that catches are correlated with abundance, it appears that common squid abundance is maintaining a relatively high level and there is some indication of an inverse abundance relationship between common squid and sardine.

In the Russian zone, chub mackerel were known to appear as far north as the coast of Primorye at the beginning of 1920s but annual catches did not exceed 25 t. In the 1930s larger catches indicated that the species was present in greater numbers. Increased abundance in during the 1940s allowed a specialized fishery to operate. Catches steadily increased until 1951 when catches exceeded more than 10,000 t in Primorye. However at the end of the 1950s, chub mackerel catches decreased and the fishery became unprofitable. Strong year-classes at the beginning of the 1990s were reflected in sharp in short-term increases of mackerel catch near the coast of the Korea peninsula and the appearance of mackerel eggs in the more northern part of its range in 1996.

Japanese anchovy appeared in Primorye waters at the beginning of the 1920s, but fishing was limited to incidental catches of about 200-300 kg per day. Systematical catch data have been collected in Russia since 1944 as fisheries reacted to an earlier collapse of the sardine population. In the 1960s anchovy catches reached 16.8 t annually. During this period, anchovy were spawning in southern Primorye but from the middle of the 1970s, the abundance of anchovy in the Russian zone declined. In the 1990s, anchovy were the first species that reacted to changes in nekton. One to two year old anchovy accounted for 30% of the bycatch during sardine expeditions in the open waters of the Russian 200-mile zone in 1989. The high level of anchovy stocks and active spawning in northern regions has placed anchovy in the leading role in ichthyoplankton surveys of the JES during the last years.

Hokkaido-Sakhalin herring were once very abundant. A peak catch of 972 thousand t occurred in 1897. Catches gradually declined and by the 1950s herring were no longer spawning in the region.

Konoshiro gizzard shad (*Konosirus punctatus*) were rare in Russian waters until 1996, but since then the spawning of gizzard chard has been increasing in the coastal waters of northwest part of the JES. Eggs and larvae of this species and anchovy were numerous and in some years it practically dominated in ichthyoplankton samples.

Japanese and Korean fisheries harvest Pacific salmon in the JES, while Russian fisheries operate in rivers. Pink salmon (*Oncorhynchus. gorbuscha*) are the most abundant species of Pacific salmon in the JES. Unlike chum salmon (*O. keta*) they remain in the JES and become vulnerable to fisheries in the JES. Masu salmon (*O. masou*) are also resident in the JES but in far fewer numbers. Catches of pink salmon declined during the early part of the 1990s. Long time series of historical catches in Russia indicate that pink salmon catches were higher during first half of the 20th century than in the latter half.[xxiv]

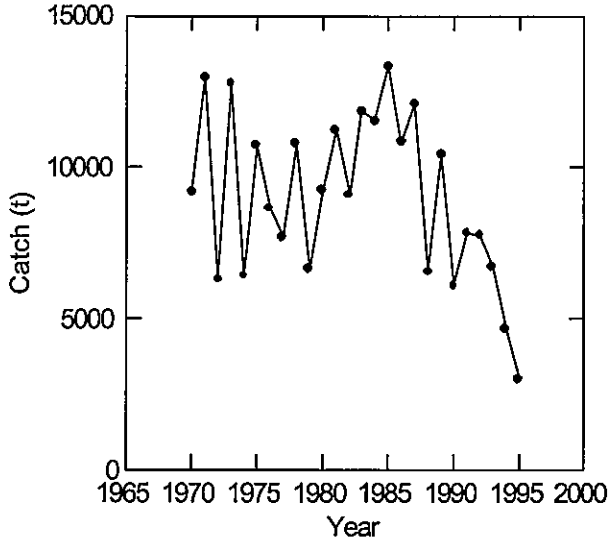

Figure 11 Total catch of pink salmon in the Japan/East Sea by Japan, South Korea and Russia[xxiv].

Chum salmon (*O. keta*) are released in large numbers from Japanese hatcheries located as far south as Ishikawa Prefecture (~36.5°N). The number released in recent years is of the order of 200 million fry.[xxv] The mean fry to adult survival for these fish (0.32%) is about one tenth that of chum salmon released from hatcheries in Hokkaido and lower than that found on the Pacific side of Honshu. It appears that the years of best survival occurred before the 1976/77 regime shift. Chum salmon survival was negatively correlated with SST in May off Fukura (~39°N) in Yamagata Prefecture.

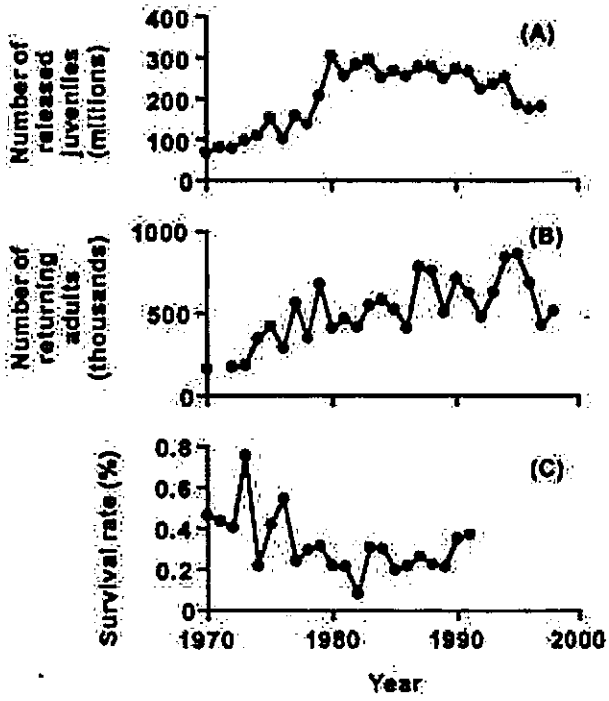

Figure 12 Annual numbers of juvenile chum salmon released from hatcheries in Honshu, the numbers of adults returning and their survival[xxv]

Catches of masu salmon (*O. masou*) in Japan have declined since 1973. Prior to 1973, they were included in catches of pink salmon.

Seabirds

Studies of seabirds populations on Teuri Island (Hokkaido) have been conducted since 1984. The diets of black-tailed gull (*Larus crassirostris*), rhinoceros auklet (*Cerorhinca moncerata*) have been conducted since 1984 and Japanese cormorant (*Phalacrocorax capillatus*) since 1992. Gulls and auklets foraged on Japanese sardine when they were abundant during the 1980s. The diets changed abruptly with collapse of the Japanese sardine population in the early 1990s. The rising abundance of anchovy in 1992 was reflected in the seabird diets, particularly rhinoceros auklet. Black-tailed gulls initially switched from sardine to sandlance, although with increasing fractions of anchovy beginning in 1998. The role of the Tsushima Current on seabird diets is an active area of investigation.

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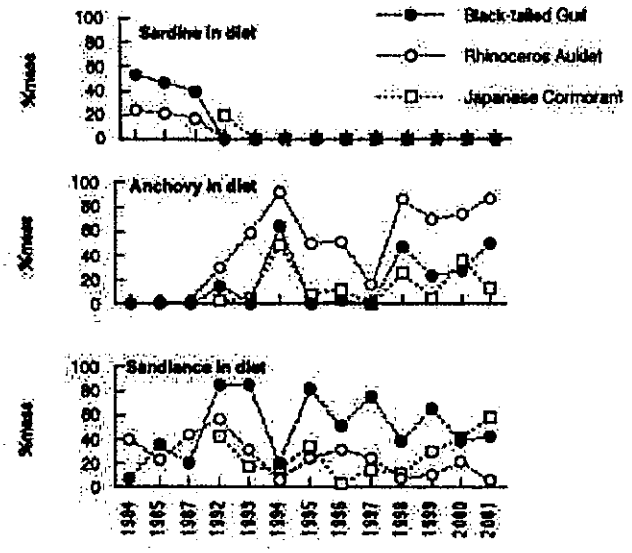

Figure 13 Year to year changes in diet composition of seabirds breeding on Teuri Island (Hokkaido)

Slaty-backed gull (*L. schistisagus*), black-tailed gull and Japanese cormorant were observed in the Syokanbetsu River (Hokkaido) estuary eating juvenile chum salmon (*O. keta*) in April 1999 after the fry were released from the hatchery. The increased abundance of gulls in the estuary during this period was dramatic[xxvi].

Marine mammals

Pinnipeds Largha seals (*Phoca largha*) aggregate in Peter the Great Bay (Primorye, Russia) to mate and to molt. Early records of largha seal catches suggest that its abundance in Peter the Great Bay in the 19th century may have been as high as several thousand, decreasing considerably by the 1930s[xxvii]. The local population size was recently estimated to be about 1,000 individuals with further growth limited by incidental take in the trap net fishery.

Cetaceans No reports.

Issues

Key questions and data requirements

Better models are required to investigate forcing mechanisms. There is an urgent need to maintain observations, as several scientific programmes in the region are ending.

The physical processes that are responsible for stratifying the water column are the most critical for primary biological production in the JES. The strength and timing can be monitored by satellite using ocean colour data, and with careful calibration of new data and recalibration of archival data, it may be possible to make better use of historical satellite observations.

How is stratification controlled? To determine this there is a need for monitoring programs in the JES, particularly now that the JMA buoy has been terminated.

Satellites cannot sense subsurface chlorophyll so it is important to understand the dynamics of the subsurface chlorophyll maximum to determine its role in important primary production in the JES? How is the physiological parameter of primary production controlled.

Can satellites accurately estimate magnitude of primary production during short blooms. There is a need for *in situ* optical monitoring from buoys.

How is the LTL foodweb in the JES structured? To begin to answer this, there is a need for size fraction data and information on functional groups.

Long-term study was based on small datasets (3 stations, 4 times/yr): Extensive monitoring program including satellite observation. Minimum of 1 station in north and 1 in south.

Long timeseries of zooplankton samples from 150-surface may not adequately represent long-term trends because of the deep diel migrations of some of the dominant species.

Threats

The frequency of red tides and ichthyotoxin incidents in the JES is increasing. In fact, during the CREAMS/PICES 2002 workshop in Seoul, one of the largest outbreaks of the fish killing alga, *Cochlodinium polykrikoides,* occurred of southern and eastern Korea and resulted in huge losses of farmed fishes. Outbreaks of this and closely related species seem to be predominantly problems in Korea (where it is the main source of severe losses)[xxviii].

The former Soviet Union and, now Russia, have reportedly dumped radioactive waste in the JES since the 1950s, threatening marine flora and fauna and potentially human health because of radioactive contamination of seafood. Few studies of the effects have been conducted[xxix]

Contributors

Much of the information contained in this chapter was presented at the CREAMS/PICES Symposium on *Recent Progress in Studies of Physical and Chemical Processes in the East/Japan Sea and their impact to its ecosystem* held 22-23 August, 2002 at the HOAM Faculty Club of Seoul National University in Seoul, Korea. A half day for discussion and synthesis was organized by PICES on the morning of 24 August.

Physical oceanography: **Steven Riser** (University of Washington) was largely responsible for the text.

Nutrients: **Sanae Chiba** (JAMSTEC), **Pavel Tischenko** (Pacific Oceanological Institute)

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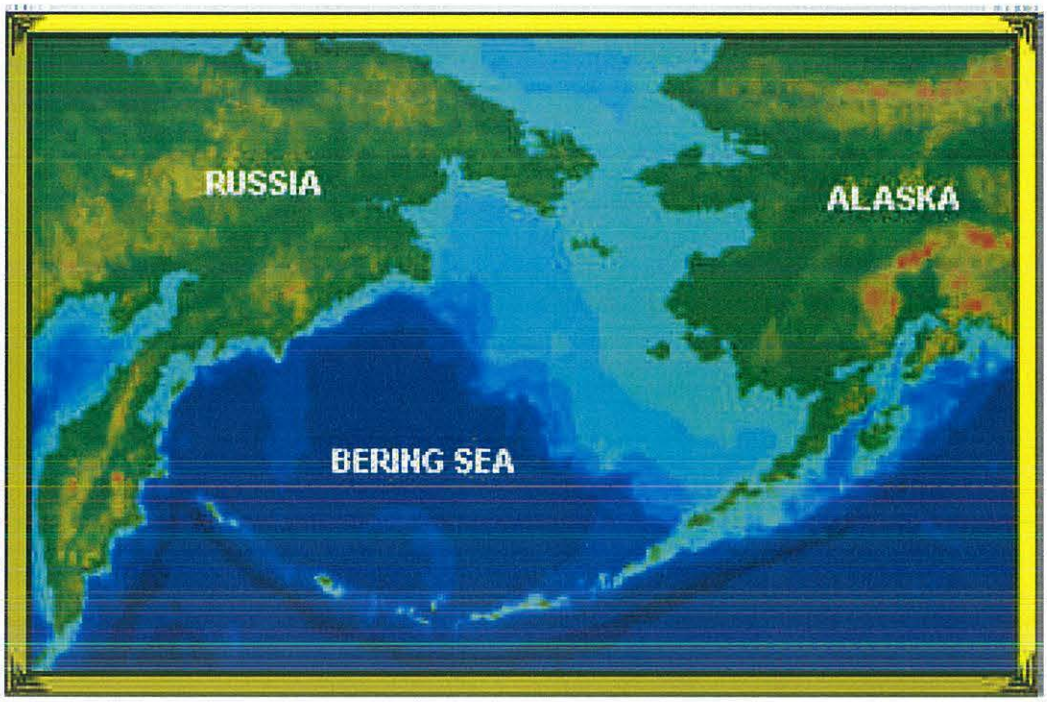
Sample report for discussion only

Bering Sea/Kamchatka



Background

The Bering Sea – Kamchatka region is a semi-enclosed high latitude sea. It has a deep basin (3,500 m) and shallow (<200 m) continental shelves, with a broad shelf (>500 km wide) in the east contrasting with a narrow shelf (<100 km) in the west[xxx]. In summer, three domains (coastal, middle, and outer) can be distinguished on the eastern shelf by their hydrographic conditions and circulation patterns. These domains are separated by fronts, which constrain the cross-shelf exchange of properties and are important locations for ecosystem interactions. As it is a high latitude system, there are large seasonal differences in solar radiation, wind forcing, and sea ice. The region is connected to the North Pacific through the Aleutian island arc and has a shallow connection with the Arctic Ocean through the Bering Strait. The region can be considered as a continuation of the North Pacific subarctic gyre, with water from the Alaska Stream in the Gulf of Alaska flowing into the eastern Bering Sea, moving counter-clockwise to the western Bering Sea, and exiting through Kamchatka Strait[xxxi]. The long-term mean summer bottom water temperature on the eastern Bering Sea shelf is 2.4°C; and the long-term mean summer surface temperature is 6.6°C.

The Bering Sea – Kamchatka region has very high biological productivity, but it is strongly seasonal. Over 266 species of marine phytoplankton have been identified in the Bering Sea phytoplankton community, comprising 8 taxonomic classes[xxxii]. Rates of primary productivity up to 225 g C m^{-2} yr^{-1} have been reported from the most productive areas[xxxiii]. Over 300 species of zooplankton occur in the Bering Sea, with copepods, coelenterates, and amphipods the most abundant taxa. Zooplankton biomass production is also strongly seasonal and varies regionally, with estimates up to 64 g C m^{-2} yr^{-1} from the shelf edge in the eastern Bering Sea to 4 g C m^{-2} yr^{-1} for the coastal domain[xxxiv]. The region includes more than 450 species of fish and invertebrates, of which about 25 are commercially important. Forage fishes such as capelin (*Mallotus villosus*), eulachon (*Thalichthys pacificus*), deep sea smelts (Bathylagidae), myctophids, Pacific sand lance (*Ammodytes hexapterus*), and Atka mackerel (*Pleurogrammus monopterygus*) and juvenile cephalopods can be locally abundant. They are significant prey items of larger cephalopods, fishes, marine mammals and seabirds[xxxii]. Most important among the commercial species are groundfishes such as walleye pollock and flatfishes, and several species of

crabs and Pacific salmon. With such high primary and secondary production, some commercially important species can reach very high abundances; in 1998, catches from this region comprised about 50% of all fish landings in the U.S.. Most commercial populations of fishes and crabs have exhibited cyclic changes in abundance, at least over the period of recent observations (since the 1970s). The high biological productivity of the region also supports rich assemblages of marine birds and mammals (38 species of seabirds, and 25 species of mammals)[xxxii]. Marine birds and mammals have low reproductive rates, low annual mortality, and long life spans. For seabirds, changes in population trends for those species examined have generally been attributed to changes in productivity rather than changes in survival[xxxii]. The past 30 years have seen large changes in the ecosystem of the Bering Sea – Kamchatka region, with dramatic changes in abundances of salmon, crabs, and groundfishes; declines in marine birds and pinnipeds, which have lead to fishery closures; unusual distributions of whales; and recent novel blooms of unusual phytoplankton and zooplankton. The final Ecosystem Status Report is intended to include the entire region, however, this draft report will focus on recent conditions in the eastern Bering Sea.

Highlights

Oceanographic and ecosystem dynamics are dominated by sea ice (annual extent, duration, timing), which is sensitive to climate variations.

The region is known for high biological productivity that is strongly seasonal. Some of the largest fisheries in the U.S. occur in the eastern Bering Sea.

Sea water temperatures have been cooling through the 1990s although it was warmer in 2001 due to less sea ice that was the result of unusual wind patterns.

The eastern Bering Sea has experienced unusual blooms of both phytoplankton and zooplankton. Coccolithophore blooms have occurred during summer since 1997. Large jellyfish have become increasingly abundant through the 1990s, and have the potential to adversely affect juvenile walleye pollock (by competition and by direct predation).

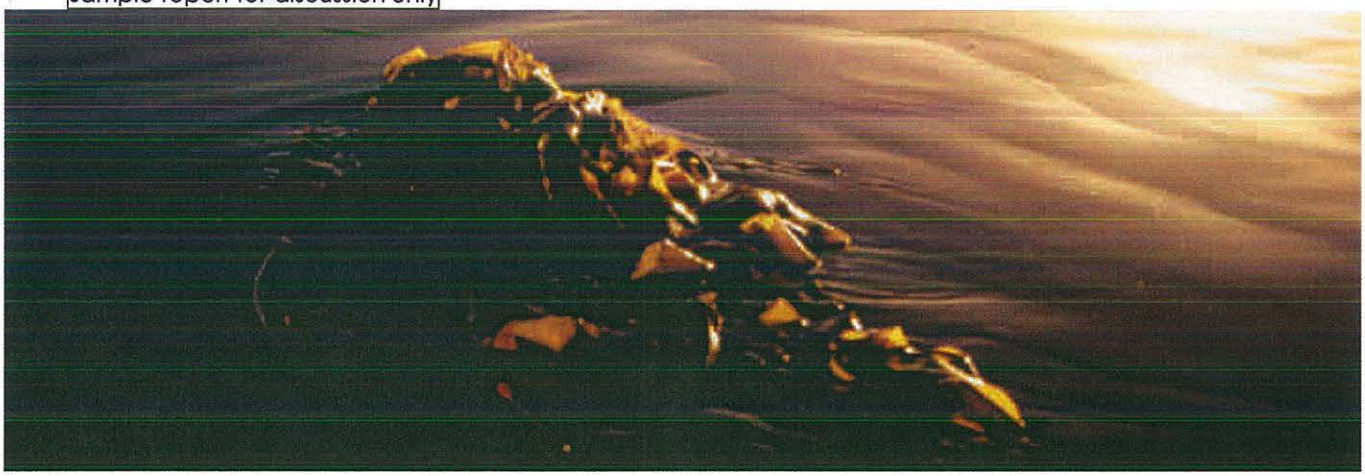
Major shifts in abundance of fish and invertebrate populations occurred over the past 20 years although recently, groundfish populations appear to have stabilised. Catches of Pacific salmon continue to decline.

There are concerns about declines in Stellar sea lions and northern fur seal populations, and unusual distributions of endangered whales. Reproductive success of piscivorous seabirds been above average in recent years.

Significant issues for this region include the effects of climate warming, novel phytoplankton and zooplankton blooms, interactions of commercial fishing with bottom habitats, and marine mammals.

Critical Factors Causing Change

The most significant proximate factors causing changes to the marine ecosystems of eastern Bering Sea are sea ice and fishing. The role of sea ice, its annual extent and duration, is central to the functioning of the ecosystem. Sea ice affects the timing, amount, and fate of primary production, the hydrographic (temperature and salinity) properties and the strength of vertical stratification, and the spatial distributions of marine predators and prey.



The timing of the spring bloom is related to the presence of sea ice: if ice is present in mid-March or later it will trigger a strong phytoplankton bloom; if ice is not present in the spring, the phytoplankton bloom will occur later (e.g. in May) once the water column has stratified[xxxv]. The edge of the sea ice also has important influences on local phytoplankton production. In turn, sea ice is sensitive to variations in meteorological conditions, such that small variations in wind velocity and direction can greatly affect the extent, timing, and duration of ice. The locations of the Arctic High and Aleutian Low pressure regions governs the paths and intensities of the storms that impact the Bering Sea, particularly in winter. This region is therefore quite sensitive to low-frequency climate variations and change. Large-scale climate processes that influence the Bering Sea include those that are indexed by the Arctic Oscillation (AO) and the Pacific North America (PNA) pattern (which correlates with the Pacific Decadal Oscillation).

The predominant direct human forcing on the eastern Bering Sea is fishing. The amount of fishing effort (measured as bottom trawling time) increased in 2000 compared with 1999, and the total number of vessels fishing also increased, although total recent effort is less than that for 1991-1998. There was more bottom area closed to trawling in 2000 than in 1999, which had the effect of concentrating trawling in those areas open to fishing[xxxv].

Status and Trends

Hydrography

Sea ice in the Bering Sea has shown decadal-scale variability. There was less ice and warmer temperatures after the late 1970s, although the amount of sea ice has been increasing during the 1990s. Year 2001 was unusual in being a very low sea ice year, mostly due to strong southerly winds that kept the ice north of 60°N[xxxv]. Sea ice also disappeared early in 2000 and 2001.

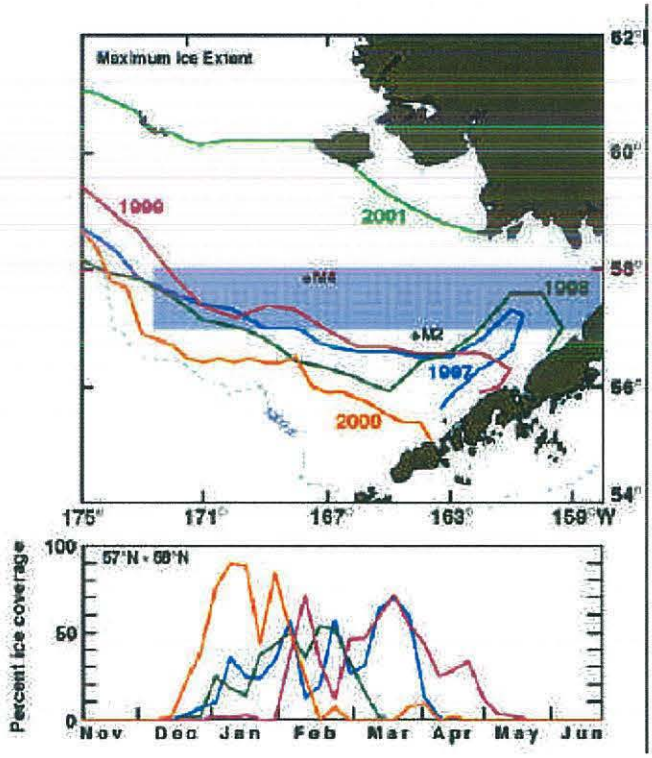


Figure 14 The extent (upper panel) and timing (lower panel) of ice cover in the eastern Bering Sea in recent years.

Mean annual SST at the inlet passes into the southeast Bering Sea shelf has been decreasing through the 1990s. In 2001, however, as a result of the unusual winds and the lack of ice on the shelf, summer bottom temperatures were slightly warmer and surface temperatures cooler than average[xxxv].

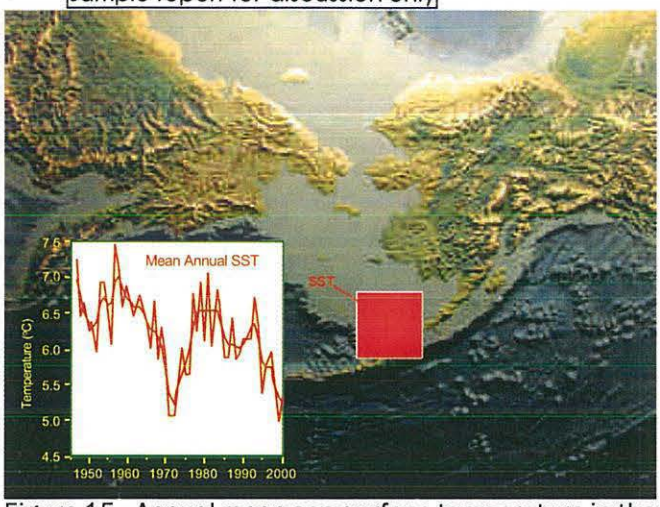


Figure 15. Annual mean sea surface temperature in the Aleutian passes.

Chemistry

No data

Plankton

The spring phytoplankton bloom occurred later in spring in 2000 and 2001, as a consequence of the early retreat of ice from the eastern Bering Sea. Unusual, and sometimes very large, coccolithophore blooms have been observed on the eastern Bering Sea shelf each year since 1997. They occurred again in 2001, although not as intense as previous years.

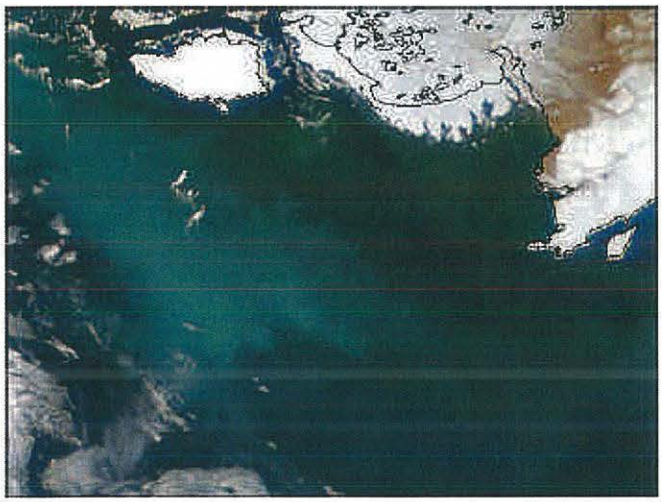
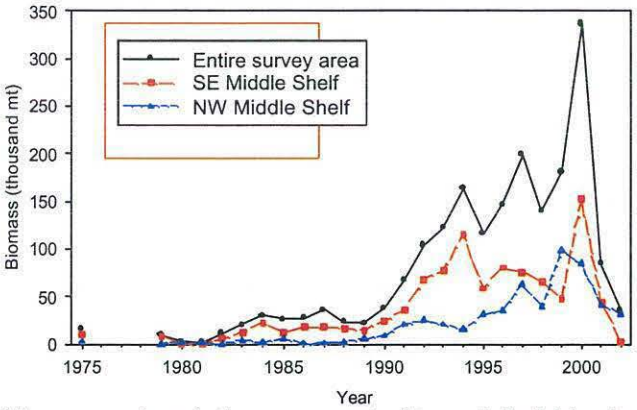


Figure 16 Satellite image of coccolithophore bloom in 2000

The most striking changes in zooplankton are associated he huge increases and sudden decline in



biomass of gelatinous zooplankton (jellyfish) since 1989. Most of this increase was due to the large scyphozoea *Chrysaora melanaster*[xxxvi]. The catch of jellyfish during the summer surveys in 2000 were the highest recorded, with an estimate for the area surveyed of 336,673 t, although the densities were highly variable on local spatial scales. Abundance has dropped dramatically in the most recent years.

Fish and Invertebrates

Major shifts in demersal fish and benthic invertebrates began in 1980[xxxv]. There were strong increases in the biomass of walleye pollock, Pacific cod, rock sole, and non-crab benthic invertebrates (echinoderms, molluscs, sponges, ascidians). Pollock and cod had low biomass in the cold period 1971-1976, increased after 1976, but in the 1990s have been variable and slightly below that during the 1980s. Research vessel estimates for 2001 indicate a 19.5% decrease of pollock biomass from year 2000, and an increase of 57% for Pacific cod. Rock sole were observed to have extended their range through the 1990s, at the same time as arrowtooth flounder increased in abundance[xxxv].

In 2000, the total estimated biomass of commercial groundfish species was about the same as in 1999, with walleye pollock the dominant species. The total commercial catch biomass in 2000 was about the same as in 1999, also with walleye pollock as the dominant species. Generally, groundfish recruitment was estimated to be below average[xxxv].

Catches of chinook salmon, sockeye salmon, and coho salmon have declined since the mid-1990s, whereas catches of pink salmon are relatively stable. Catches of chum salmon peaked in 2000, and have declined markedly since.

Sample report for discussion only

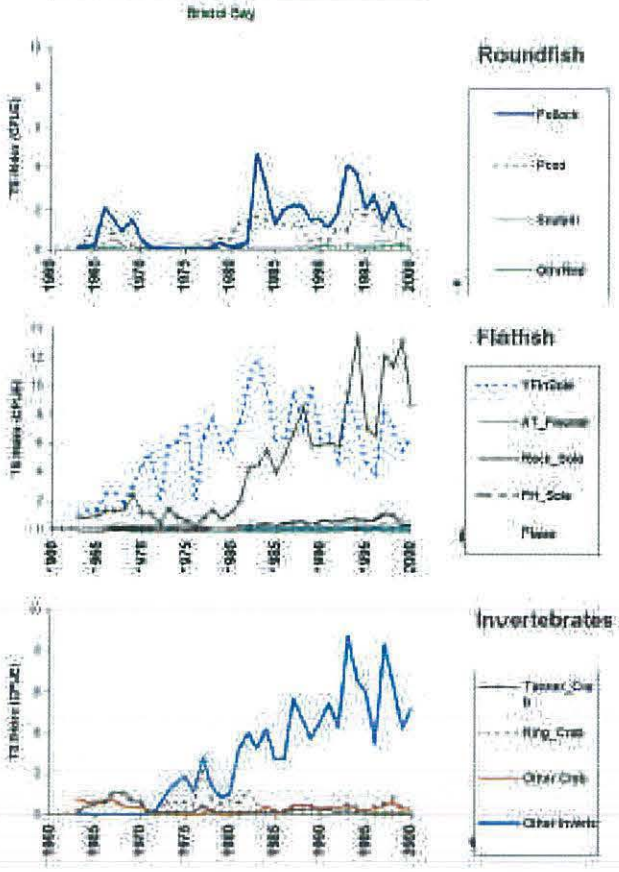


Figure 17 Timeseries of commercial fisheries in Bristol Bay.

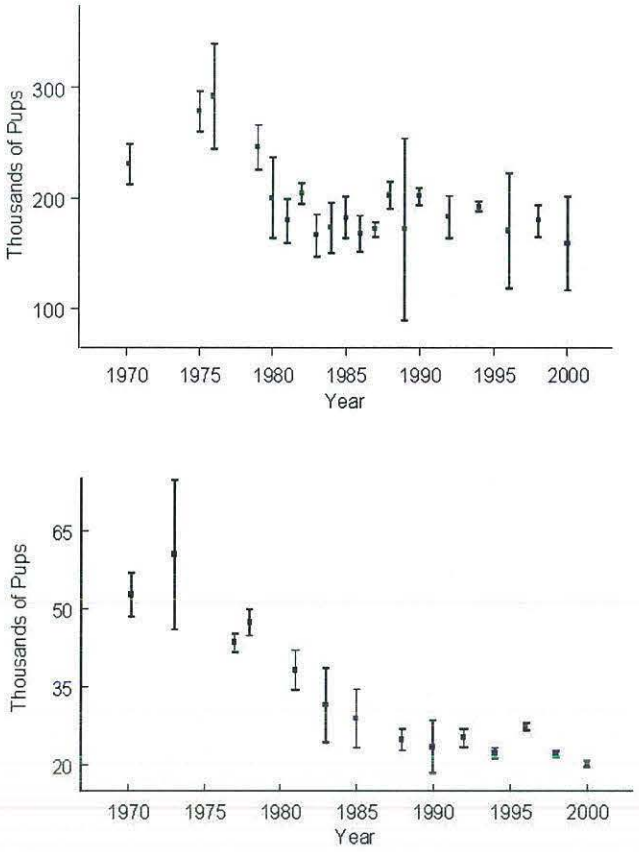


Figure 18 Counts (mean and standard error) of northern fur seal pups at rookeries on St. Paul (A) and St. George (B) Islands, Pribilof Islands (York and Kosloff, 1986; Loughlin et al., 1994; NMFS, Unpubl. Data). Note rapid declines between 1976 and 1984[xxxvii]

Marine Mammals and Seabirds

Stellar sea lions live predominantly along the Aleutian island arc, but some also occur in the Bering Sea. Through the 1990s the abundance of this species has been declining by 2-8% per year, and the cause is the subject of intense investigation. Northern fur seals (*Callorhinus ursinus*) are found throughout the northern North Pacific but breed only at the Commander and Pribilof Islands. Seventy-four percent of the world population breeds on the Pribilof Islands. The number of northern fur seal pups has been declining since 1975.

It is estimated that 40-50 million seabirds live in the eastern Bering Sea, and summer migrants add another 30 million. In 2000, seabirds began nesting earlier than average, in contrast to 1999 when nesting began later. The reproductive success of piscivorous birds was generally better than average in 2000 whereas it was about the same in 2000 as in 1999 for planktivorous birds.

Issues

Climate warming

How will this system respond to global warming? Changes forecast for the Bering Sea include decreasing numbers of storms (less ocean mixing), leading to reduced nutrient levels, less sea ice, and higher sea temperatures. Ecosystem changes observed over the past 5 years include major coccolithophore blooms, high mortality of shearwaters in 1997, reduced salmon abundance, and unusual whale distributions[xxxviii].

Novel phytoplankton blooms

The coccolithophore blooms have occurred annually since 1997, whereas they had not been observed prior to 1997. The cause(s) of the blooms are unknown but they alter the carbonate chemistry of the water and may increase dimethylsulfate production[xxxviii]. They may also replace the small flagellates that are normal dominant

in summer. Since these blooms are readily observed by satellite, they affect light penetration in the ocean, with unknown consequences for other organisms.

Jellyfish abundance

The abundance of gelatinous zooplankton increased substantially after 1989. The dominant species are both predators on, and competitors with, juvenile stages of commercial fishes such as walleye pollock. These medusae can have an effect on zooplankton abundance that is greater than that of age 0 walleye pollock. Competition with jellyfish for food may have a negative impact on the biomass of walleye pollock. The increase in jellyfish abundance may be due to a release from predation by planktivorous forage fishes[xxxvi]. After peaking in 2000, substantial reductions in jellyfish abundance have been observed.

Interactions of trawling with benthic habitat

An ecosystem-based approach to the management of groundfish fisheries which interact with other benthic species is being adopted in Alaska[xxxix]. This includes closing areas of critical habitat to fishing, and careful monitoring of the effectiveness of these closures and the impacts of displacing effort to other locations.

Marine mammals

The decline of Stellar sea lions in Alaska is presently the subject of intense investigation, in particular to identify any potential negative impacts of fishing for walleye pollock, an important prey species of the sea lions. Unusual distributions of endangered North Pacific right whales (*Eubalaena japonica*) have been identified over the past 5 years, with a shift to shallower waters on the shelf and different prey species[xl]. This may make such endangered species more susceptible to ecosystem changes.

Contributors

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Sample report for discussion only

California Current

Background

The California Current System extends 3000 km from Baja California Sur to the northern tip of Vancouver Island in British Columbia. It includes a relatively narrow continental shelf (depths < 200 m) which is widest (~ 100 km) off southern Vancouver Island. Typical seasonal values of temperature and salinity range from 7-14 °C and from 28-31 psu off British Columbia to 34 psu off southern and Baja California. The two major sources of freshwater are the Columbia and Fraser rivers. Ocean circulation tends to be driven large-scale currents and winds. The southward flowing California Current dominates the upper layers, whereas the northward flowing California Countercurrent occurs between 200-400 m depth along the entire region. In fall and winter, equatorward flow of the surface layers reverses to poleward flow as the Davidson Current. The entire region experiences either direct or indirect effects of El Niño – Southern Oscillation (ENSO) events, as well as decadal-scale variability associated with regime shifts.

Fishery resources include invertebrate populations, especially in the near-shore waters, important groundfish populations along the continental shelf, and large and highly migratory pelagic species such as Pacific salmon, Pacific sardine (*Sardinops sagax*), Pacific hake (*Merluccius productus*), Pacific herring (*Clupea pallasi*) at the northern end of the region, and northern anchovy (*Engraulis mordax*) and squid (*Loligo opalescens*) at the southern end. The region is home to many marine mammals and seabirds.

Highlights

Cooler conditions, with stronger than normal coastal upwelling that developed in 1999 have persisted through 2002. They appear to be part of a large-scale pattern that covers the entire North Pacific, and are consistent with those experienced during a La Niña and/or the negative phase of the Pacific Decadal Oscillation.

Biological productivity has been higher over the past four years than in the 1990s, particularly off California. There have been large changes in the distributions and composition of zooplankton and fish species, consistent with more favourable conditions for cold-water species. This may represent a change in the carrying capacity of the system.

Seabird productivity appears to have improved in recent years in both the southern (California) and northern (British Columbia) sections of the region.

Zooplankton concentrations off Baja California were very low in 2001 and 2002, perhaps due to depression of the normal subtropical fauna by the cool waters.

Sample report for discussion only

Critical factors causing change

Climate

The region experienced a strong change in the late 1990's as it shifted from El Niño conditions in 1997-1998 to La Niña conditions in 1999 (Ocean/Climate Chapter). La Niña – like to near-normal conditions have persisted since 1999. The result has been a shift over much of this region from warm, low productivity to cool, higher productivity conditions. Some large-scale indices (e.g. Pacific Decadal Oscillation, PDO) changed from near-neutral to moderately strong negative values[xlii]. A negative PDO characterizes cool near-surface temperatures in the California Current System.

Fisheries

The number of vessels with recorded commercial landings in California declined 20% between 1995 and 1999, to 2690 vessels[xlii].

Status and Trends

Hydrography

Near-surface temperatures changed from well-above normal during the 1997-1998 El Nino to well-below normal with the 1999 La Nino. In California, sea surface temperatures during the 1999 upwelling season were 3-4 °C below normal. Recent near-surface temperatures have been slightly below their mean. Recent near-surface salinities have been near or above their 1990-1996 mean values[xliii].

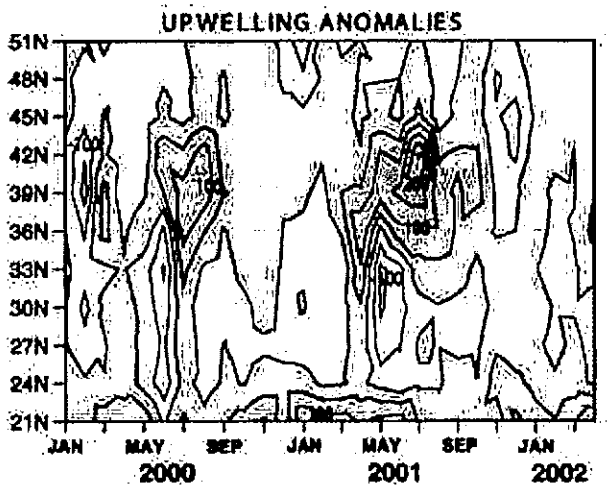

Figure 19 Monthly upwelling index anomaly for January 2000–April 2002. Shaded areas denote positive anomalies (greater than the 1948-67 monthly averages). Units are in m^3/s per 100 km of coastline.

Summertime upwelling-favourable winds, i.e. equatorward winds that drive coastal upwelling of cool nutrient rich water, varied from light during the 1997-1998 El Niño to strong during the 1999 La Niña. Upwelling was extremely strong during 2000 and 2001 from about San Diego to the Columbia River, and off southern Baja California. Other than the record 1999 upwelling, 2001 featured the highest mean summer upwelling index since 1981. Weaker than normal upwelling prevailed off northern Baja California in 2001. April 2002 indices indicate that the latest upwelling season is off to another strong start[xlii].

Since 1999, the core of the southward-flowing California Current has been strong, and displaced offshore of its normal position, particularly in southern California[xliii]. At the northern end of the California Current System off British Columbia, mean currents have been near-normal and poleward in winter, and weaker poleward or more strongly equatorward than normal in summer. The timing of spring and fall reversals in current direction in the northern part of the system occurred as normal[xliv]. Sea surface temperatures at British Columbia coastal lighthouses under the influence of the California Current (Amphitrite, Kains Island, and Pine Island) have persistently lower spring temperatures since 1999[xlv]. Average spring temperatures in 1999 had not been as cool since before the 1976/77 regime shift.

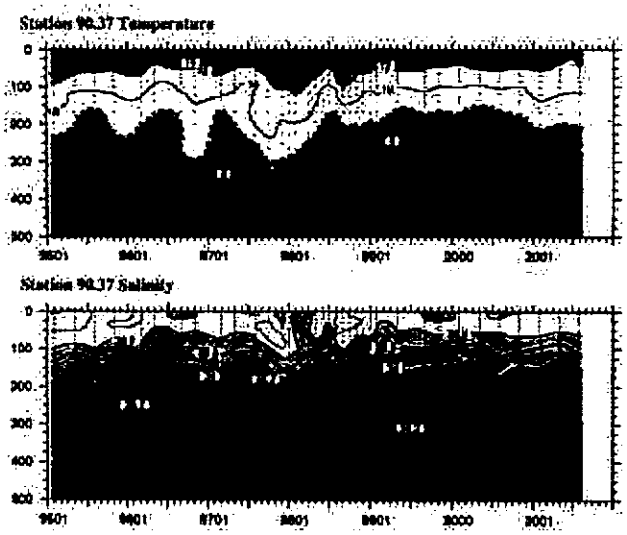

Figure 20 Time series of temperature and salinity over the upper 500 m at CalCOFI station 90.37 (between San Clemente and Catalina Islands), 1995–2001. Temperature contour interval is 2°C for T>10°C, 1°C for T<10°C. Salinity contour interval is 0.2. Dots denote positions of samples.

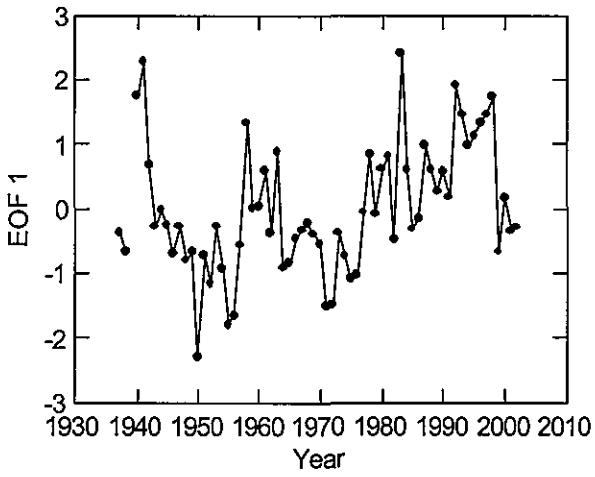

Figure 21 EOF 1 values indicate the shared history of spring (April/May) sea surface temperatures from 1935 to 2002 at 3 coastal lighthouses in the northern California Current region.

Chemistry

Nutrient concentrations, represented by nitrate, were low in the offshore, northern sector during the 1997-1998 El Niño. They have continued to increase since then, reaching pre-1990 levels. Higher nitrate concentrations on the continental shelf are also a result of stronger upwelling[xliv].

Plankton

Phytoplankton Chlorophyll *a* concentrations were high during the La Niña of 1999, and have been near normal in recent years after the below-normal concentrations during the 1997/987 El Niño. At the northern end of the region, SeaWIFS satellite data suggest the spring blooms may have begun a month earlier (in March) in recent years than normal[xliv].

The relatively high concentrations of chlorophyll observed on recent CalCOFI cruises may be part of a longer term tendency of higher production in the CCS. CalCOFI observations indicate that recent levels are substantially higher than historical values. The spring and summer means for the past four years represent a 14% increase from 1991-97, and a roughly 40% enhancement over the period prior to 1991. This may be related to summer coastal upwelling at 36°N during 1998-2001 being 27% stronger than during 1991-97.

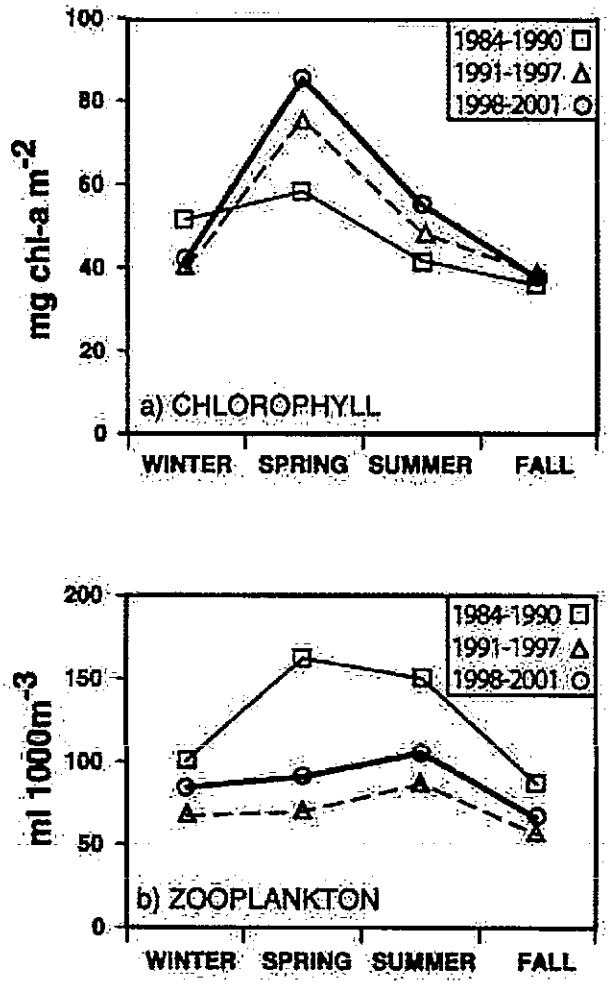

Figure 22 Seasonal averages of a) chlorophyll and b) macrozooplankton biomass from the CalCOFI cruise means, comparing seasonal means for 1984-90 (squares), 1991-97 (triangles), and 1998-2001 (circles).

Zooplankton The timing of peak zooplankton biomass differed between the southern California, northern Baja California, and central Baja California regions during the 1997-98 El Niño event. In this particular event, southern California waters were poor in zooplankton biomass, but biomass was high in Baja California waters. In contrast, zooplankton biomass remained low in Baja California during the 1998-99 La Niña, while the southern California region experienced a strong rebound[xli] with macrozooplankton biomass near its long-term (1951-1984) mean in southern sectors and a more normal gradient of cool water boreal species in the northern sections to warm water sub-tropical species in the southern sections[xli].

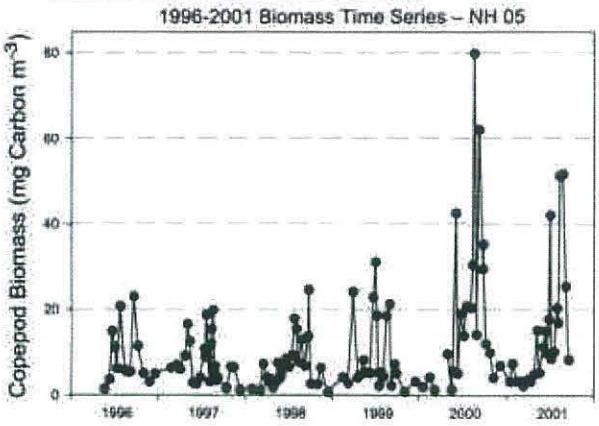

Figure 23 Time series of copepod biomass at station NH 05 (60 m water depth) off Newport, OR, 1996–2001. Biomass units are mg carbon m^{-3}.

Fish and Invertebrates

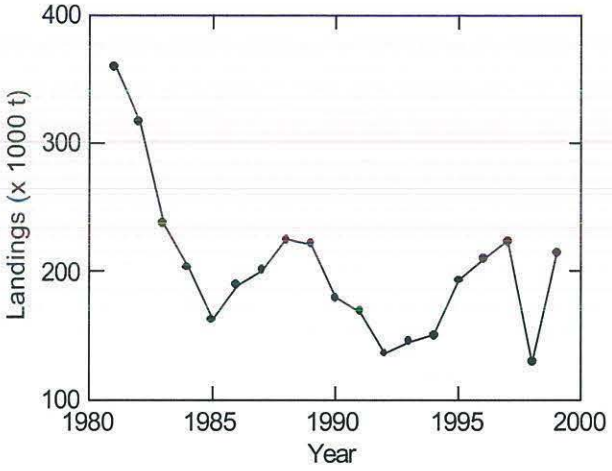

Figure 24 Annual total landings (x 1,000 t) of commercially caught species in California.

Total landings of commercial species in the California Current System have not shown strong trends recently. This is in part a result of compensation by one species group for the declines of another species group. The general trend has been for warm water species to have been favoured during the El Nino conditions of the mid-1990's at the expense of cool water species. Declines have occurred with groundfish, sea urchins (in California), sharks and swordfish (*Xiphias gladius*), salmon, and abalone, whereas expanding fisheries have occurred for squid, shrimp, and coastal pelagic species such as sardine, mackerels, and Pacific hake. Declining species appear to have been impacted by a combination of unfavourable environmental conditions and extensive fishing pressure[xliii].

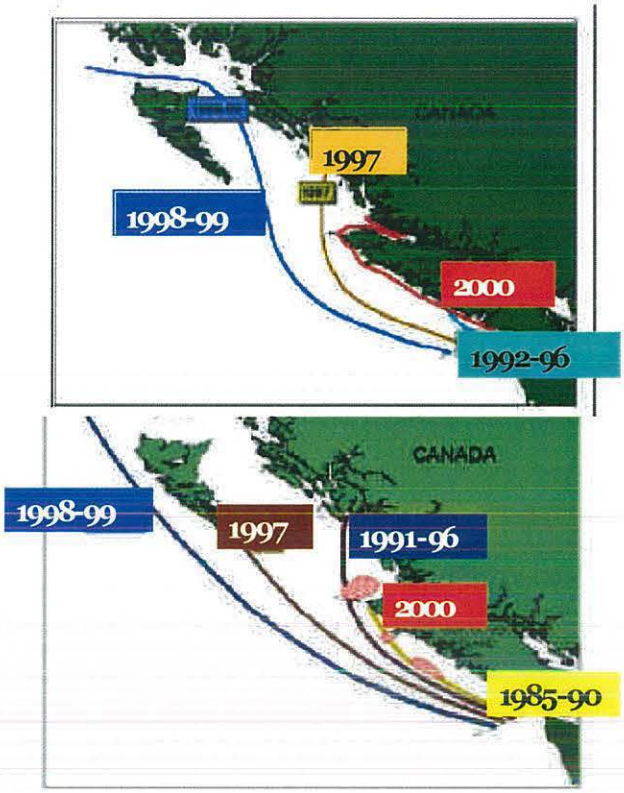

Figure 25 Distributions of Pacific sardine (above) and Pacific hake (below) in the latter part of the 20th century.

The shift to cool La Nina conditions is expected to alter the mix between warm and cool-tolerant species, although the full impact of this shift on these higher trophic levels will take several years to become apparent because of the different life spans among species. However, large shifts in the distributions of migratory coastal pelagic species such as sardine and Pacific hake have occurred with the colder conditions since 1999: the extensive northward distributions of these species that occurred during El Niño have retracted strongly southwards.

Surveys conducted in the vicinity of the Columbia River are finding that catches of forage fishes (whitebait smelt, Pacific herring, and northern anchovy) have been increasing from very low levels in 1999. Only sardine abundance has remained constant between 2000 and 2001[xlvi].

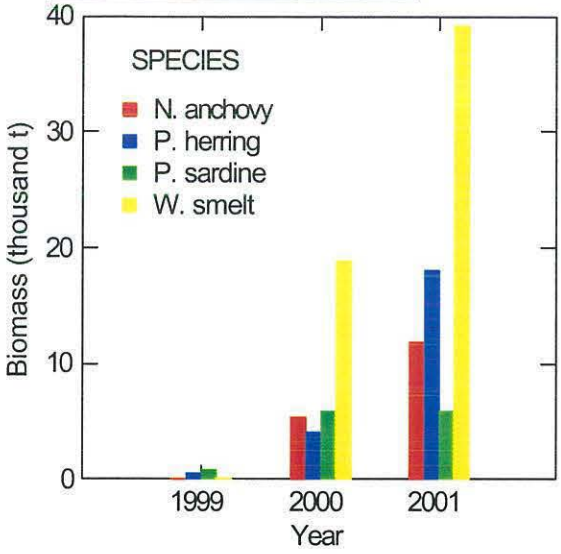

Figure 26 Annual densities of whitebait smelt, Pacific herring, northern anchovy, and Pacific sardine off the mouth of the Columbia River from April to July[xlvii].

Seabirds

Productivity data from 2001 from California shows enhanced seabird productivity after the 1998 regime shift. The period 1999–2001 yielded significant increases in the productivity of Cassin's auklet (*Ptychoramphus aleuticus*), pelagic cormorant (*Phalacrocorax pelagicus*), and pigeon guillemot (*Cepphus columba*), and marginally significant increases in the productivity of Brandt's cormorant (*Phalacrocorax penicillatus*), and rhinoceros auklet (*Cerorhinca monocerata*). Only one species, the common murre (*Uria aalge*), did not display a significant increase in productivity after 1998[xli].

At the northern end of the California Current system, in British Columbia, the timing of breeding for rhinoceros auklet, tufted puffin (*Fratercula cirrhata*) and Common Murre was similar to 1999 and 2000. In contrast, the timing of breeding for the planktivorous Cassin's auklet was advanced over the previous two years, so that the earliest hatch date in the Triangle Island series was recorded in 2001[xliv].

Marine mammals

Sea otter (*Enhydra lutris*) populations in the California Current system are expanding. In California, this population growth ceased during the 1997-1998 El Niño, possibly due to a reduction in food. The interaction of sea otters with commercially fished species, in particular invertebrates, is an important issue.

Due to the rapid expansion of some California Current fisheries, in particular in California, there has been an increase in the number of incidental captures of marine mammals in fishing operations[xlii]. A major issue is therefore how to reduce this incidental capture of marine mammals. California sea lion (*Zalophus californianus*) and harbor seal (*Phoca vitulina*) populations appear to be growing, although fishing mortality has increased on sea lions. The Stellar sea lion (*Eumetopias jubatus*) population along the west coast of North America (excluding Alaska) is estimated to be about 39,000 individuals, which is less than 50% of the 1956-1960 population estimate. This species is now listed as endangered. Many whale populations are growing, including humpback whale (*Megaptera novaeangliae*) and gray whale (*Eschrichtius robustus*), and the latter was been removed from the endangered species list in 1994. PCB concentrations in free ranging killer whales measured in British Columbia are among the highest measured for cetaceans in the world, putting them at risk for toxic effects. Transient killer whales (*Orcinus orca*) which migrate widely along the west coast of North America were the most heavily contaminated[xliii].

Issues

Key questions and data requirements

Major issues include lack of understanding of the interactions among environmental variability, recruitment fluctuations, and fishing pressure; over-harvest of low mobility species such as abalone and rockfishes; interactions between fisheries and marine mammal populations; and pollution/contaminants problems.

How the 1999 regime shift will affect the California Current System is unclear. There is a need for expanded and coordinated monitoring of the system.

When will the next El Niño occur? Weak signals of building El Nino's periodically arise from conditions in the tropical Pacific.

Contributors

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Sample report for discussion only

Inter-American Tropical Tuna Commission

The Inter-American Tropical Tuna Commission (IATTC) defines the eastern Pacific Ocean (EPO) as the area bounded by the coastline of North, Central, and South America, 40°N, 150°W, and 40°S. IATTC staff maintain records for most of the vessels which fish at the surface for yellowfin tuna (*Thunnus albacares*), skipjack tuna (*Katsuwonus pelamis*), bigeye tuna (*T. obesus*), or Pacific bluefin tuna (*T. orientalis*) in the EPO. Of these, bluefin tuna and albacore tuna are the most relevant to the region of interest to PICES. Records are not maintained for sport-fishing vessels and small craft, such as canoes and launches.

Pacific bluefin tuna

Most of the catches of Pacific bluefin tuna in the EPO are taken by purse seiners. Nearly all of this catch is made west of Baja California and California, within about 100 nautical miles of the coast, between about 23°N and 33°N. Lesser amounts of Pacific bluefin tuna are caught by recreational, gillnet, and longline gear. They are caught during every month of the year, but most of the fish are taken from May to October. The distributions of purse-seine catches of Pacific bluefin tuna in the EPO during 1970-1989 appear below.

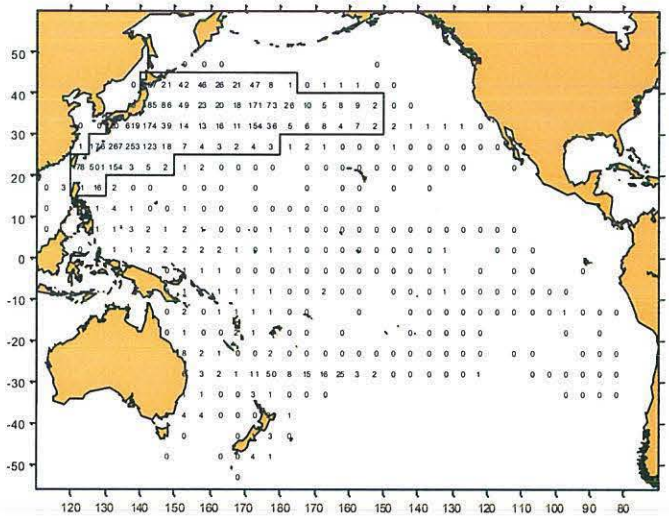

Figure 27 5° latitude by 5° longitude quadrangles in which Pacific bluefin tuna were captured by the Japanese longline fleet during January 1952 – December 1997[li]. The numbers indicate the total number of Pacific bluefin tuna (100s) removed from each quadrangle during this period (zeros indicate catches of less than 51 fish). The quadrangles inside the polygon extending from Japan to 150°W constitute the core area[l]

In the EPO, Pacific bluefin tuna are most often found in waters where the sea surface temperatures are between 17° and 23°C[xlix]. Fish 15 to 31 cm in length are found in the western Pacific Ocean (WPO) in waters where the SSTs are between 24° and 29°C. Conditions in the WPO probably influence the portions of the juvenile fish there that move to the EPO, and also the timing of these movements. Likewise, conditions in the EPO probably influence the timing of the return of the juvenile fish to the WPO.

Pacific bluefin are exploited by various gears in the WPO from Taiwan to Hokkaido[xlix]. Age-0 fish about 15 to 30 cm in length are caught by trolling during July-October south of Shikoku Island and south of Shizuoka Prefecture. During November-April age-0 fish about 35 to 60 cm in length are taken by trolling south and west of Kyushu Island. Age-1 and older fish are caught by purse seining, mostly during May-September between about 30°-42°N and 140°-152°E. Bluefin of various sizes are also caught by traps, gillnets, and other gear, especially in the Sea of Japan. Bluefin are also caught near the southeastern coast of Japan by longlining.

The high-seas longline fisheries are directed mainly at tropical tunas, albacore, and billfishes, but some Pacific bluefin are also caught. Catch distributions of bluefin by Japanese longliners during 1952-1997 in the Pacific Ocean are shown above[li]. Small amounts of Pacific bluefin are also caught by Japanese pole-and-line vessels on the high seas.

Various indices of abundance of Pacific bluefin in the EPO have been calculated, but none is entirely satisfactory. Pacific bluefin are most often found in waters where the SSTs are between 17° and 23°C[lii], so the 1° areas north of 23°N and west of California and Baja California in which the SSTs were in that range during May through October were defined to be "bluefin habitat."[liii] The catches of Pacific bluefin in those 1° areas during each year were divided by the corresponding numbers of unstandardized days of fishing effort to obtain CPUE (Fig. 18). Indices of abundance of bluefin for the WPO were prepared by IATTC and by scientists from other nations. Watters' time series of abundance indices for the "core area" (Figure 27) in the WPO for the Japanese longline fishery are shown in Figure 19.

Sample report for discussion only

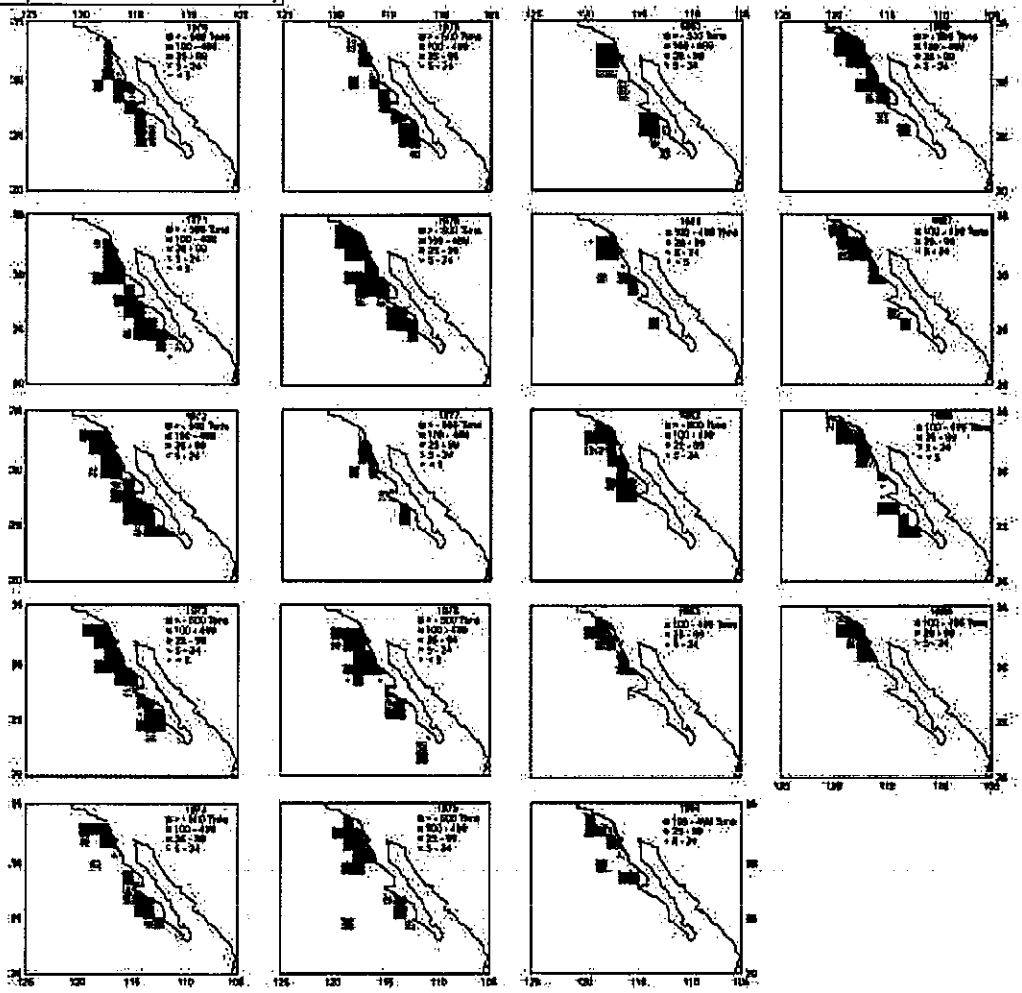

Figure 28 Annual distributions of Pacific bluefin tuna catches in the eastern Pacific Ocean, 1970-1989[liv].

The National Research Institute of Far Seas Fisheries, Japan, has been tagging Pacific bluefin tuna with archival tags to study the relationships between their movements and the physical environment[lv,lvi]. The first recapture of a Pacific bluefin tuna that made a trans-Pacific migration while carrying an archival tag was reported[lvii].

There was general agreement at a working group meeting on bluefin tuna in December 2000, to start the process of developing a Pacific-wide assessment of bluefin tuna using the same length-based age-structured model approach used for yellowfin and bigeye tunas in the EPO[lvi].

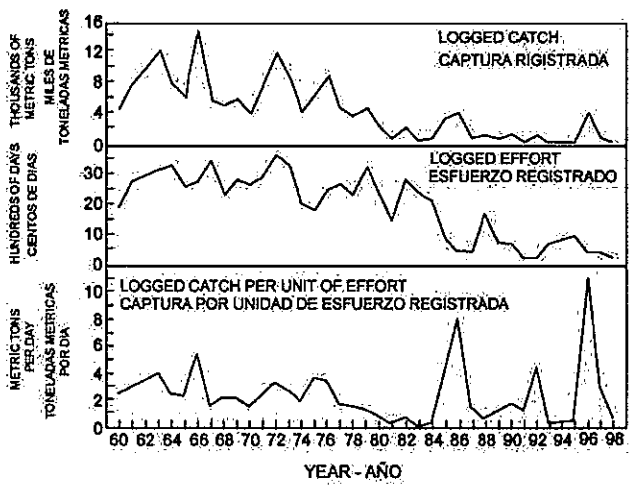

Figure 29 Catch, effort, and catch-per-unit of effort data for the surface fishery for bluefin tuna in the EPO, as determined by the habitat index method. The data for 1998 are preliminary[xlix].

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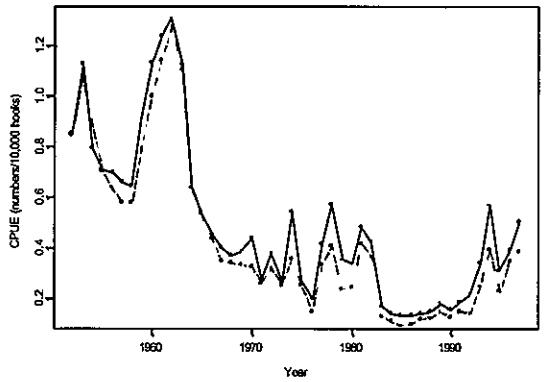

Figure 30 Time series of regional abundance indices for the core area. The trend with a dashed line and open circles is the time series estimated from the safe abundance indices. The trend with a solid line and filled circles is the time series estimated from pooling the safe and the extrapolated abundance indices[lii].

Albacore tuna

There are two stocks of albacore in the Pacific Ocean, one occurring in the northern hemisphere and the other in the southern hemisphere. In the North Pacific, the adults live mostly in the Kuroshio Current, the North Pacific Transition Zone, and the California Current, but spawning occurs in tropical and subtropical waters[lviii].

Albacore are caught by longliners in most of the North Pacific, but not often between about 10°N and 5°S, by trollers in the eastern and central North Pacific, and by baitboats in the western North Pacific[lviii]. Albacore are caught by fisheries from several nations, including Canada, Japan, Republic of Korea, Mexico, People's Republic of China, Taiwan, U.S.A, and others. During the 1980s and 1990s, the catches have ranged between about 45,000 and 75,000 metric tons in the North Pacific.

There appear to be two subgroups of albacore in the North Pacific Ocean. The fish of the northern subgroup occur mostly north of 40°N when they are in the eastern Pacific Ocean. There is considerable exchange of fish of this subgroup between the troll fishery of the eastern Pacific Ocean and the baitboat and longline fisheries of the western Pacific Ocean. The fish of the southern subgroup occur mostly south of 40°N in the eastern Pacific, and relatively few of them are caught in the western Pacific. Fish that were tagged in offshore waters of the eastern Pacific and recaptured in the coastal fishery of the eastern Pacific exhibited different movements, depending on the latitude of release. Most of the recaptures of those released north of 35°N were made north of 40°N, and most of the recaptures of those released south of 35°N were made south of 40°N.

The distribution of catches per day's fishing for albacore tuna caught by U.S. troll vessels in 1999 in the North Pacific[lix] appears in Fig. 32 and the distributions of catches per hook of albacore tuna by Japanese longliners[lviii] averaged over 1952-1976 appears in Figure 31. Time series of recruitment, biomass, and average weights have not been prepared by the IATTC for albacore in the North Pacific Ocean.

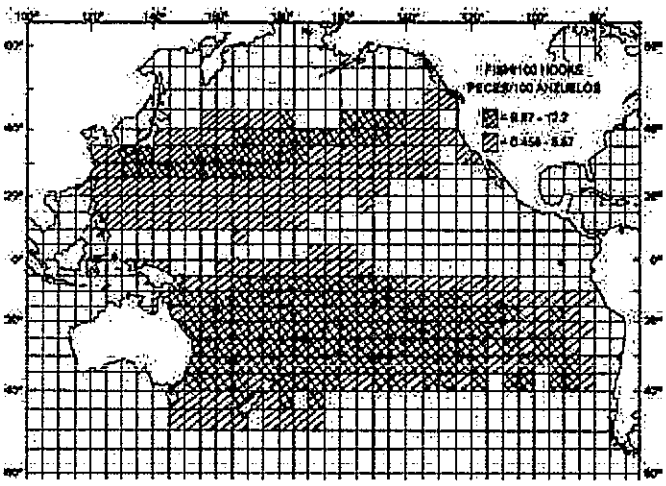

Figure 31 Distribution of catches per hook of albacore by Japanese longliners averaged over the 1952-1976 period[lviii].

Ecosystem model and climate forcing

The staff of the IATTC has been developing a modeling approach to evaluate the ecological implications of alternative fishing strategies in the pelagic tropical (EPO). Additional development and evaluation of the EPO ecosystem model was accomplished by a working group funded by the National Center for Ecological Analysis and Synthesis (NCEAS) in Santa Barbara, California. One of the products of the working group was an evaluation of the implications of climate forcing on ecosystem dynamics of the tropical EPO.

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ways that the physical environment affects ecosystem dynamics is by inducing variation in primary production at the base of the food web. The tropical EPO is strongly influenced by El Niño and La Niña events. Over a large portion of the tropical EPO, the chlorophyll concentrations are reduced during El Niño and increased during La Niña. To simulate ENSO-scale variations in producer biomass in the ecosystem model, the working group constructed an empirical model that relates SST anomalies to surface chlorophyll concentrations. They used time series of SST anomalies to specify trajectories of producer biomass, and simulated the ecosystem effects of ENSO-scale pulses and cycles and a time series of producer biomass predicted from a greenhouse-warming scenario for the 21st century. A manuscript describing the analysis has been submitted to *Fisheries Oceanography*, and is in review at the present time.

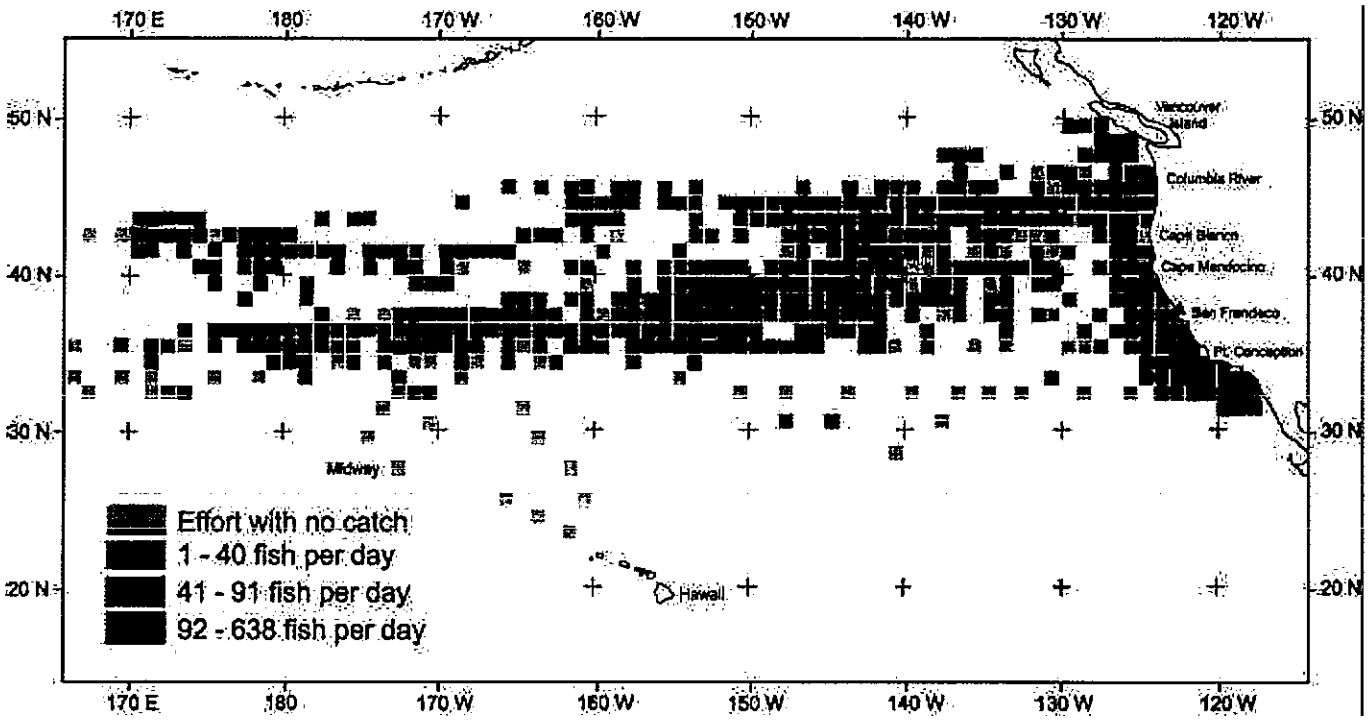

Fig. 32 Distribution of albacore CPUEs by U.S. troll vessels in the North Pacific Ocean during 1999[IIx].

Contributors

Robert Olsen, Inter-American Tropical Tuna Commission

Sample report for discussion only

International Pacific Halibut Commission

Distribution

Pacific Halibut (*Hippoglossus stenolepis*) are found throughout the coastal waters of Alaska, British Columbia, Washington, Oregon and into northern California. The center of abundance is the central Gulf of Alaska, particularly near Kodiak Island. The depth range for adult halibut ranges from 50 m in the summer to 600 m during winter spawning. Pacific halibut are generally found in temperatures from 3-9° C.

Biology

Pacific halibut mature at approximately 8 years of age. During the spawning season - generally November to March - adult fish move to deeper waters near the edge of the continental shelf. Halibut are broadcast spawners with fertilization occurring by random external contact. Halibut eggs and larvae drift in the surface currents for 6-7 months after spawning. During this long pelagic phase, halibut are moved generally west in the Gulf of Alaska and north into the Bering Sea by the dominant surface currents before settling to the bottom in shallow waters in late spring and summer. The relative distribution of recruited halibut (i.e. fish age eight and older) biomass by area remains relatively constant from year to year. To achieve this continuity, juvenile halibut migrate back to the south and east towards their spawning grounds. This counter migration usually takes place between ages 2 and 6. Adult halibut show seasonal migration (to deeper water for spawning) but very little directed migration.

Pacific halibut is the largest flatfish in the world, reaching a length of 2.7 meters and weight of 300 kg. It has a flat, diamond shaped body; the colored side is a mottled brown and over 99% are dextral, i.e., the eyes are on the right side of the fish. The oldest identified halibut was a 55 year old male however fish over 25 years of age are uncommon. Females grow much larger than males.

The Fishery

A commercial fishery for halibut has existed since 1888. During the 20th century, landings ranged between 17,000 and 40,000 metric tons. The current health of the fishery is attested to by the fact that some of highest landings on record were taken in the last 5 years of the 1990s. Since 1995, the fishery has been managed under an Individual Transferable Quota system. Currently, the ex-vessel value of the fishery is around $US 175 million. In addition to the commercial fishery there is a growing sport fishery and halibut are also captured incidentally in other North Pacific groundfish fisheries.

Climate Influences

During the 20th century, there have been dramatic and persistent changes in the growth and recruitment of Pacific halibut that cannot be readily explained by changes in stock size. Over the last 15 years, the growth of halibut has decreased substantially, especially in Alaska.

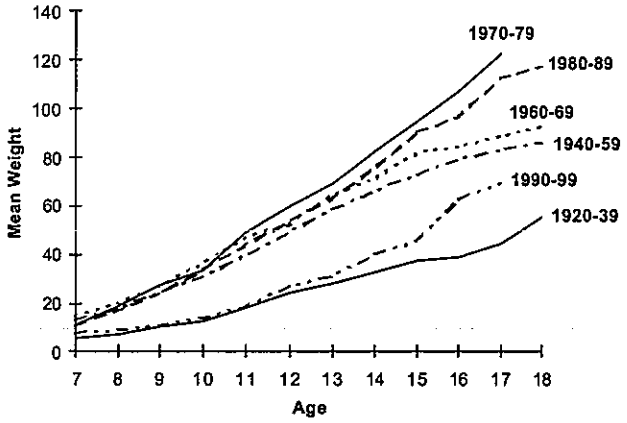

Figure 33 Changes in mean weight at age for female Pacific halibut in Alaska, 1925-2000

An eleven-year-old female halibut landed in Kodiak, Alaska averaged 40 pounds in weight in 1980. In 1995, the average weight for the same age female halibut was less than 20 lbs. Fifteen years ago fish of a given age were substantially larger in Alaska than in British Columbia; now there is no difference. In both respects, halibut growth is similar to what was observed in the 1920s and 1930s. An increase occurred sometime during the 1940s, and the present decrease began in the mid-1970s. Fish are also maturing at a smaller size now than they used to, while the age at maturity is quite close to what it has always been.

There have also been clear decadal variations in halibut recruitment all through the century, or at least since about 1935. Most recently there was a run of good year-classes spawned in the late 1970's through late 1980's, apparently followed by a run of poor year-classes.

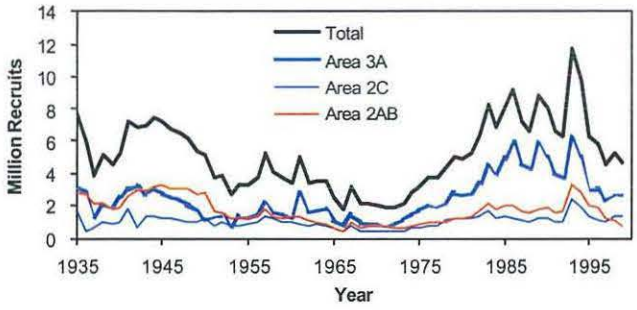

Figure 34 Long-term trends in recruitment (measured as six-year olds) for IPHC areas 2AB (British Columbia), 2C (Southeast Alaska), and 3A (central Gulf of Alaska)

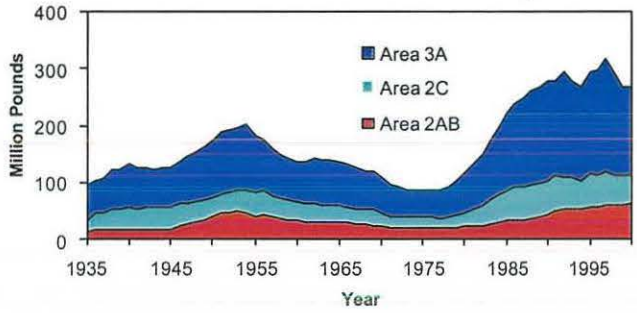

Figure 35 Long-term trends in spawning biomass for IPHC areas 2AB (British Columbia), 2C (Southeast Alaska), and 3A (central Gulf of Alaska)

This kind of alternation has sometimes been viewed as a cycle, but could just as well reflect distinct periods of different environmental conditions. Recent work has strongly suggested that halibut recruitment is driven primarily by the Pacific Decadal Oscillation (see Ocean/Climate chapter). Stock size explains very little of the variability in recruitment; use of the PDO as a covariate explains much of the observed variation however. The PDO has alternated between positive (productive for halibut) and negative (unproductive) phases every 25-35 years.

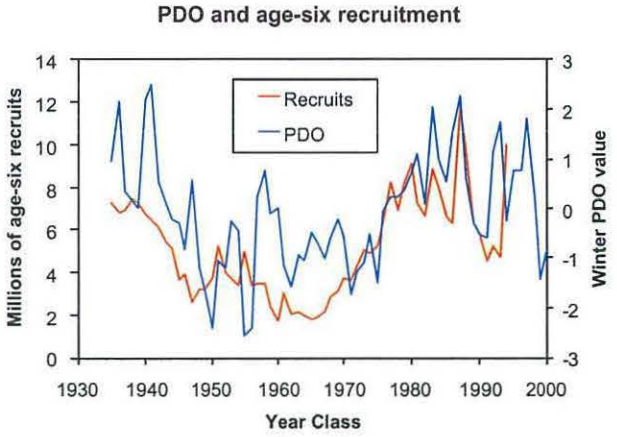

Figure 36 Timeseries of winter values of the Pacific Decadal Oscillation (PDO) and halibut recruitment.

Available time series

Age-6 Recruitment, 1935-1994, GOA and BC
: These estimates are generated from a catch-age stock assessment model

Spawning biomass, 1935-2001. GOA and BC
: These estimates are generated from a catch-age stock assessment model

Weight at age, incomplete from 1925-2000, GOA and BC
: These estimates come from fish measured during annual surveys.

Contributors

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Sample report for discussion only

North Pacific Anadromous Fish Commission

(Under construction)

The North Pacific Anadromous Fish Commission agreed to report on the status of, trends in, and issues associated with Pacific salmon in the North Pacific Ocean.

Sample report for discussion only

Sample report for discussion only

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[lii] Bell, R.R. 1963. Synopsis of biological data on California bluefin tuna *Thunnus saliens* Jordan and Evermann 1926. FAO Fisheries Report 6: 380-421.
[liii] Bayliff, W.H. 1966. Indices of abundance of northern bluefin tuna, *Thunnus thynnus*, in the eastern Pacific Ocean. *FAO Fisheries Technical Paper* 365: 460-475.
[liv] Bayliff, W.H. 1994. A review of the biology and fisheries for northern bluefin tuna, *Thunnus thynnus*, in the Pacific Ocean. *FAO Fisheries Technical Paper* 336: 244-295.
[lv] Anonymous. 1999. Report of the Sixth Joint NRIFSF-IATTC Workshop on Pacific bluefin tuna. December 8-9, 1999. Shimizu, Japan.
[lvi] Anonymous. 2000. Report of the Interim Scientific Committee Bluefin Tuna Working Group. Nov. 30-1 Dec., 2000. Shimizu, Japan.
[lvii] Tsuji, S., Itoh, T., Nitta, A., and Kume, S. 1999. The trans-Pacific migration of young bluefin tuna, *Thunnus thynnus*, recorded by archival tag. Working document submitted to the Second Meeting of the Interim Scientific Committee for Tuna and Tuna-like Species in the North Pacific. January 15-23, 1999. Honolulu, Hawaii.
[lviii] Anonymous. 2001. Status of albacore tuna in the Pacific Ocean. IATTC, Stock Assessment Report 1: 255-283.
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official record
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Exxon Valdez Oil Spill

Trustee Council

October 29, 2002

Agenda

Exxon Valdez Oil Spill Trustee Council

441 W. 5th Ave., Suite 500 • Anchorage, Alaska 99501-2340 • 907/278-8012 • fax 907/276-7178

AGENDA
EXXON VALDEZ OIL SPILL TRUSTEE COUNCIL
MEETING
October 29, 8:00 a.m.
441 West 5th Ave., Suite 500, ANCHORAGE

DRAFT

Trustee Council Members:

CRAIG TILLERY
Assistant Attorney General
State of Alaska

MICHELE BROWN
Commissioner
Alaska Department of
Environmental Conservation

DRUE PEARCE
Senior Advisor to the Secretary
for Alaskan Affairs
U.S. Department of the Interior

MARIA LISOWSKI for
DAVE GIBBONS
Forest Supervisor
Forest Service Alaska Region
U.S. Department of Agriculture

JAMES W. BALSIGER
Administrator, Alaska Region
National Marine Fisheries Service

FRANK RUE
Commissioner, Alaska
Department of Fish & Game

Teleconferenced in Anchorage, Restoration Office, 441 W 5th Ave, Suite 500
_____Federal Chair

1. Call to Order - 8:00 a.m.
   - Approval of Agenda*
   - Approval of Meeting Notes*
     August 6, 2002
   Executive Director's report
   Investment Report

2. Public comment - 8:15 a.m.

3. Executive Session - 8:15-8:45 a.m.

4. Public Advisory Committee appointments* - 8:45 a.m.

5. Scientific and Technical Subcommittee process and appointments* - 9:00 a.m.

6. Habitat protection - 9:15 a.m.
   PWS 05 (Duck Flats) and PWS 1010 (Jack Bay) ratify motion to extend*
   KEN 295 (Crowther & Thorn)*
   KEN 310 (Swartzes)*
   Northern Afognak package*

7. Break 10:15 - 10:30 a.m.

8. Joint meeting with tribal representatives of oil spill region - 10:30 a.m - noon

9. Lunch provided with tribal representatives - 12:00 - 12:45 p.m.

10. Adjourn to the Hotel Captain Cook for joint meeting with North Pacific Research Board, Northern Fund and University of Alaska - 12:45 p.m.

* Indicates tentative action items.

October 15, 2002 DRAFT

Joint Meeting
Exxon Valdez Oil Spill Trustee Council, North Pacific Research Board, Northern Fund, and University of Alaska

Hotel Captain Cook
October 29, 2002
1:00 p.m. to 5:30 p.m.

1:00 – 1:15 p.m.

Call to order
Introductions

Welcome by Arliss Sturgulewski

1:15 – 2:00 p.m.

Research and Monitoring Planning
- GEM Process Update
- NPRB Planning Process – NRC committee
- Northern Fund Planning Process
- University of Alaska plans

Discussion
- Identification of Joint Research Priorities
- Potential Synchronization of Proposal Process
- Coordination and collaboration

2:00 – 3:00 p.m.

Information and Data
- PICES North Pacific Report
- Status of Oceans and Watersheds Report
- Presentations on University of Alaska systems:
  AK Research & Development Database (ARAD) - Kara Nance
  Geographic Information Network of AK (GINA) – Buck Sharpton
- Development of Web-based information systems: EVOS, NPRB

Discussion
- Coordination and collaboration

3:00 – 3:15 p.m. *BREAK*

3:15 – 4:15 p.m.

Draft Memorandum of Agreement (MOA)

- Purpose and findings
- Cooperative and coordinated research planning
- Information and data
- Shared resources
- Joint meetings
- Participation of other entities and facilities

4:15 – 5:00 p.m.

Presentations

- IOOS/CAOS, Phil Mundy and Two Crow
- BASIS, Jack Helle
- AYK Sustainable Salmon Initiative, Joe Spaeder

5:00 – 5:30 p.m.

Public comment

5:30 – 7:30 p.m.

Reception – Quarter Deck

Representatives:

***Exxon Valdez* Oil Spill Trustee Council:**
Craig Tillery, Assistant Attorney General, State of Alaska
Michele Brown, Commissioner, ADEC
Frank Rue, Commissioner, ADF&G
Drue Pearce, Senior Advisory to the Secretary for Alaskan Affairs, US DOI
James Balsiger, Administrator, Alaska Region, NMFS
Maria Lisowski for Dave Gibbons, Forest Supervisor, USFS

North Pacific Research Board:
Chair: David Benton, Benton & Associates
Co-chair: Tylan Schrock, Executive Director, Alaska SeaLife Center

Northern Fund:
Frank Rue, Commissioner, ADF&G
Jev Shelton, United Southeast Alaska Gillnetter's Association
James W. Balsiger, Administrator, Alaska Region, NMFS
John Lubar, Area Director, North Coast, Fisheries & Oceans Canada

University of Alaska:
Charles Hocutt, Associate Dean, School of Fisheries and Oceanography

August 6, 2002
meeting notes

Exxon Valdez Oil Spill Trustee Council

441 W. 5th Ave., Suite 500 • Anchorage, Alaska 99501-2340 • 907/278-8012 • fax 907/276-7178

TRUSTEE COUNCIL MEETING NOTES

Anchorage, Alaska
August 6, 2002

By Molly McCammon
Executive Director

DRAFT

Trustee Council Members Present:

Dave Gibbons, USFS
•Drue Pearce, DOI
James Balsiger, NMFS
Frank Rue, ADF&G
Michele Brown, ADEC
*Craig Tillery, ADOL

* Chair
In Anchorage: Gibbons, Tillery, and Brown
By teleconference: Balsiger (DC), Rue (Juneau), Toohey (Anchorage)
•Alternates
Cam Toohey served as alternate for Drue Pearce or the entire meeting.

Meeting convened at 2:06 p.m., August 6, 2002, in Anchorage.

1. Approval of the Agenda

APPROVED MOTION: Approved the August 6, 2002 agenda. (Attachment A)

Motion by Brown, second by Gibbons.

2. Approval of Meeting Notes

APPROVED MOTION: Approved the July 9, 2002 meeting notes. (Attachment B)

Motion by Gibbons, second by Brown.

Public comment period began at 2:10 p.m.

No public comment received.

Public comment period closed at 2:12 p.m.

3. Investment Fund Fees

APPROVED MOTION: Approved a motion to adjust the investment fund fees as outlined in the memo to the Trustee Council dated August 6, 2002 regarding the Investment Fund Fees (Attachment C), with a correction on page 4 changing 1/12 to 12.

Motion by Brown, second by Gibbons.

Public comment period re-opened at 2:26 p.m.

No public comment received.

Public comment period closed at 2:27 p.m.

4. FY 03 Work Plan Phase I

ADOPTED RESOLUTION: Adopted resolution 02-07 approving funding of $3,725,200 for FY 03 Phase I projects as outlined in resolution 02-07(Attachment D).

Motion by Brown, second by Gibbons.

5. FY 02 Amendment to Project 02126

APPROVED MOTION: Approved a motion to provide $18,800 for the Alaska Department of Natural Resources under Project 02126 for the unanticipated contractual expenses outlined on page 3 of the memo dated July 12, 2002 from Carol Fries to Molly McCammon, including a general administrative fee of 7% (Attachment E).

Motion by Brown, second by Gibbons.

6. Afognak Island Acquisition Support

APPROVED MOTION:

Approved a motion to provide $37,700 in funds for the Alaska Department of Natural Resources to provide the following services in regard to the proposed protection of coastal habitat in Perenosa Bay and other coastal habitat on northern Afognak Island: review land and timber appraisals, review title, and conduct a hazardous materials survey and site inspection.

Motion by Brown, second by Gibbons.

7. Habitat Grant Extension

ADOPTED RESOLUTION:

Adopted resolution 02-08 approving an extension of the termination date of the United States Fish and Wildlife Service grants to The Conservation Fund and The Nature Conservancy from September 30, 2002 to September 30, 2003, an extension of due date for the grant recipients' activity report to the Council from December 31, 2002 to December 31, 2003, and a revision to the schedule for funding recipients' indirect costs from quarterly disbursement to upon request for reimbursement occurring no more frequently than every 30 days (Attachment F)

Motion by Gibbons, second by Brown.

8. Injured Resources Update

APPROVED MOTION:

Approved a motion to adopt the Status of Injured Resources and Services dated July 29, 2002 with a motion to amend by Gibbons, seconded by Balsiger, approving the following changes: move Subtidal Communities from "Recovered" to "Recovery Unknown" and include corresponding language changes in the recovery description of subtidal communities.

Motion by Brown, second by Gibbons.

Public comment period re-opened at 4:23 p.m.

Public comment received from one individual in Anchorage.

Public comment period closed at 4:27 p.m.

Meeting adjourned 4:28 p.m.

Motion by Gibbons, second by Brown.

36 inches

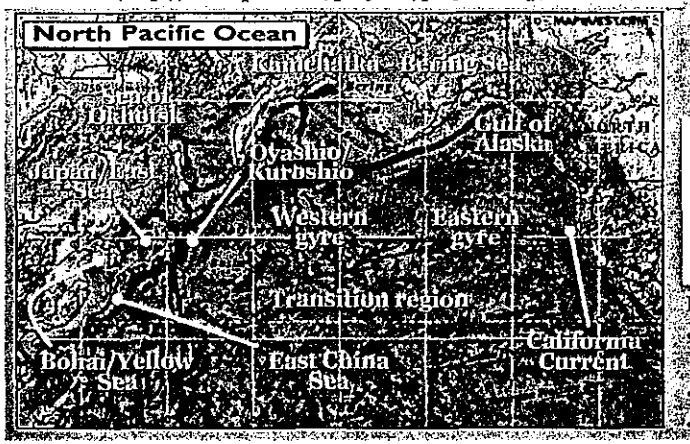
22.5 inches

PICES North Pacific Ecosystem Status Report: an update

R. Ian Perry, DFO, Pacific Biological Station, Nanaimo, BC, Canada (perryi@pac.dfo-mpo.gc.ca)
Skip McKinnell, PICES Secretariat, I.O.S., Sidney, BC, Canada (mckinnell@pices.int)

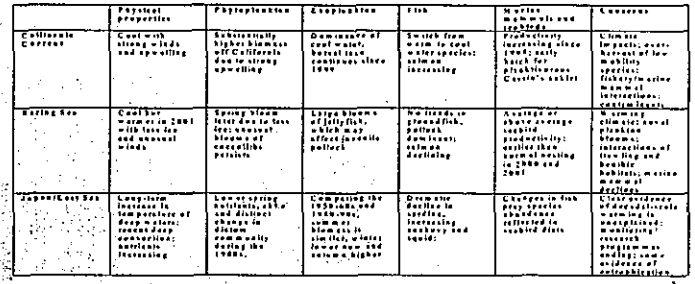
Abstract

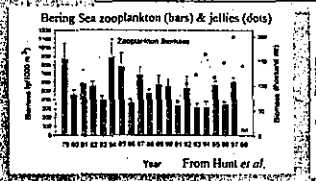
The North Pacific Ecosystem Status Report will identify factors causing changes in the ecosystems of the North Pacific Ocean, the current status and recent trends of a number of characteristics of these ecosystems, and issues such as gaps in knowledge, data, significant concerns, etc. Using models, it will also include potential future trends and concerns. This poster presents an outline of a pilot report, which develops chapters for 3 ecosystems in the eastern and western North Pacific: Japan/East Sea, Bering Sea, California Current System. This report is intended to crystallise the format and identify problems relating to flows of information. It is supported by GEM/EVOS (Alaska), NOAA, and the Census of Marine Life as part of the joint PICES project on "Marine Life in the North Pacific Ocean: the Known, Unknown, and Unknowable". Comments on this draft North Pacific Ecosystem Status Report are invited (**http://www.pices.int/projects/projects.asp**).

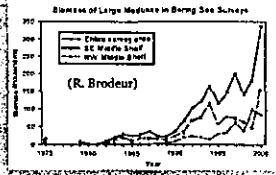


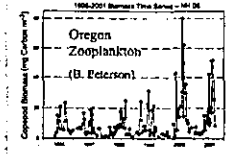
Basin-scale changes

- Strong changes in atmospheric indices that occurred in 1998-1999 have continued
- Winter (NDJF) winds from 1999-2002 (left panel) are different from those during the last cold period in 1970-1976 (right panel).although SST patterns appear qualitatively similar.





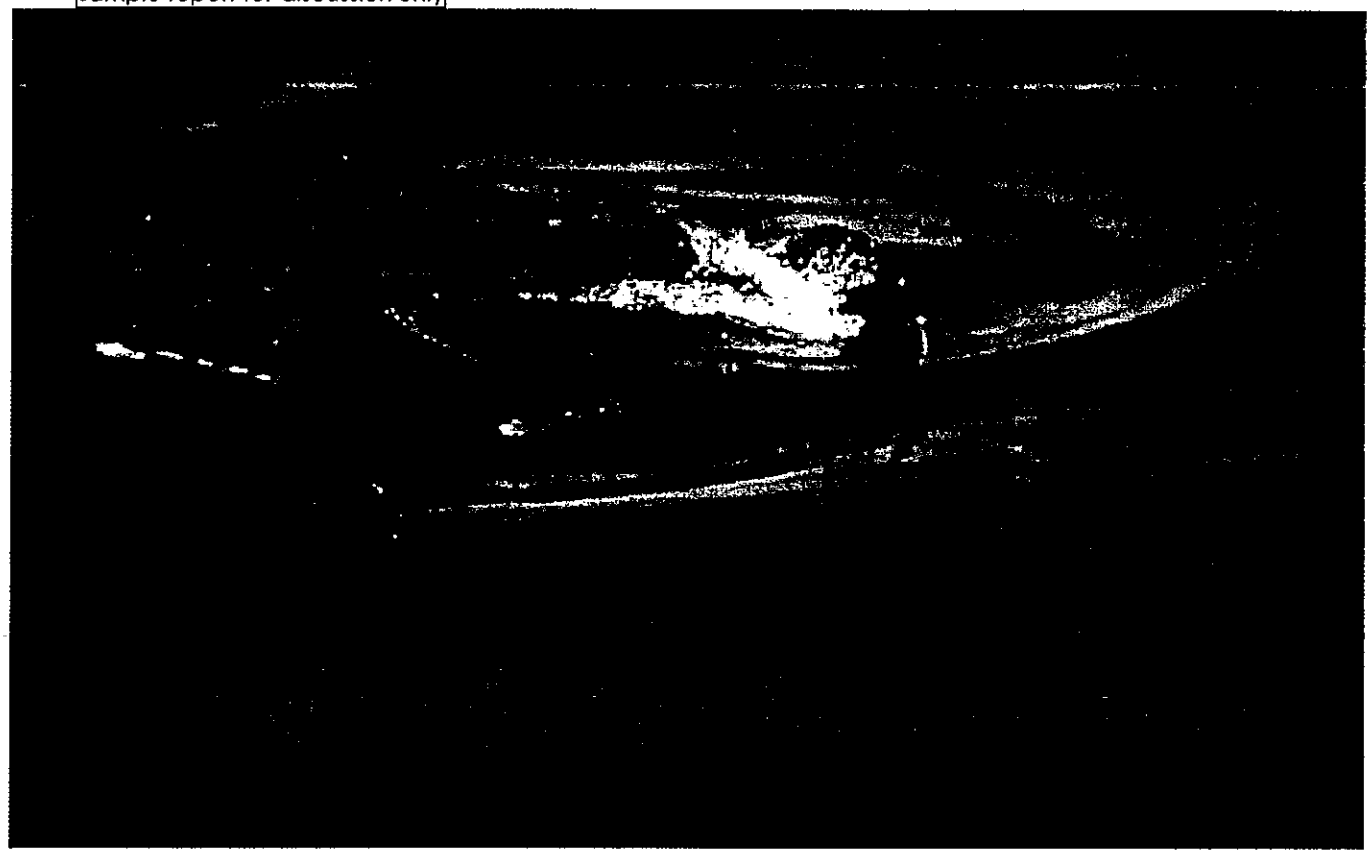




How you can contribute:

- identify published summaries or sources of recent information for Regions or "Themes" (e.g. contaminants, harmful algal blooms, etc.)
- participate in Regional workshops, and review draft chapters
- assist with tracking and archiving data

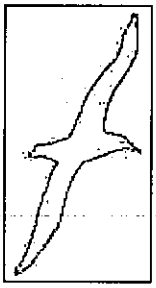
Sample report for discussion only



North Pacific Marine Science Organization
2003

Sample report for discussion only

North Pacific Ecosystem Status Report



Hyung-Tack Huh
Chairman, PICES

R. Ian Perry
Chairman, Science Board

Published by the
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A.P. Sloan/Census of Marine Life (U.S.A.)

December 2003
Sidney, British Columbia, Canada

Sample report for discussion only

Table of Contents

Sample report for discussion only

Synthesis

Under construction

Sample report for discussion only

Ocean/Climate

Pacific Decadal Oscillation

Scientists have been exploring how the atmosphere and the ocean interact in the Pacific Ocean. The El Niño phenomenon is the most famous example. Their interactions create a large region of warm surface water in the eastern tropical Pacific Ocean west of Peru; with often dramatic effects on the world's climate. A relatively new discovery is that the surface waters of the North Pacific Ocean shift between warm and cool states about every 30 years or so. When the western and central North Pacific is warm, the coast of the Gulf of Alaska is cool and *vice versa*.

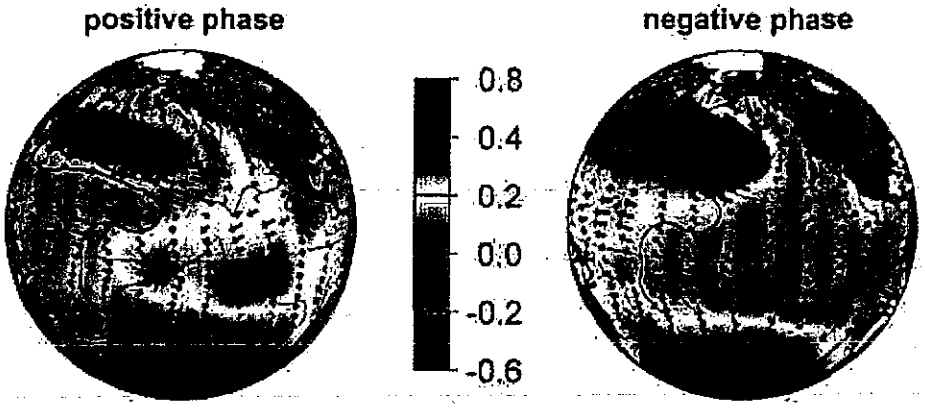

Figure 1 Two states of sea surface temperature in the Pacific Ocean. Colours indicate average temperature (°C) above and below average. Arrows indicate average winds[1].

The Pacific Decadal Oscillation Index (PDO) is a measure the state of the North Pacific sea surface. Positive values indicate warming along the North American continent and cooling in the central and western Pacific. Negative values indicate the opposite. Following the 1997/98 El Niño, the PDO index went strongly negative but increased to slightly positive values by mid 2002. While the index may vary slightly from year to year, its major characteristic is the persistence in one or the other state of nature that have become known as climate "regimes".

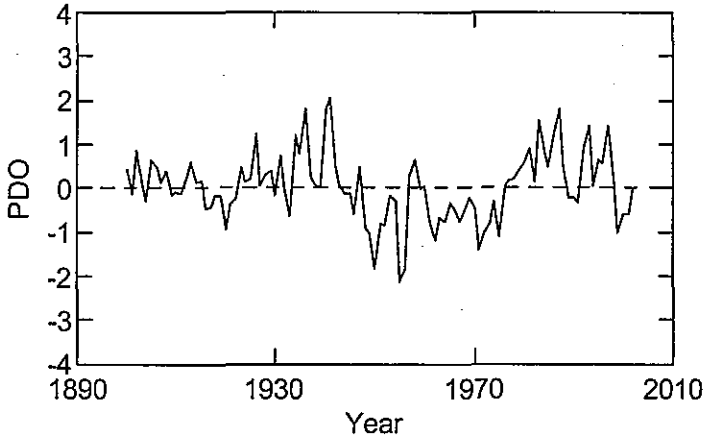

Figure 2 Trend of PDO Index from 1900 to August 2002.

North Pacific Index[ii]

The atmospheric pressure over the North Pacific Ocean varies daily, seasonally, annually, and decadally. High pressure typically brings sunny dry weather and low pressure brings storms and rain. The intensity and distribution of these air pressure patterns around the North Pacific Ocean affects regional weather and ecosystems. Two features predominate in the North Pacific, a low pressure region centered over the Aleutian archipelago in the north and a high pressure region in the south. The North Pacific (NP) Index is the area-weighted pressure of the atmosphere at the sea surface over the region 30°N to 65°N, 160°E to 140°W, roughly the region of the Aleutian Low Pressure system. It has its greatest influence in fall and winter when storms are generally most intense. Lower values of the NP index indicate lower average air pressure and greater storminess. The trend throughout the last century is similar to that of the PDO with interannual variability but also persistent regime-like patterns.

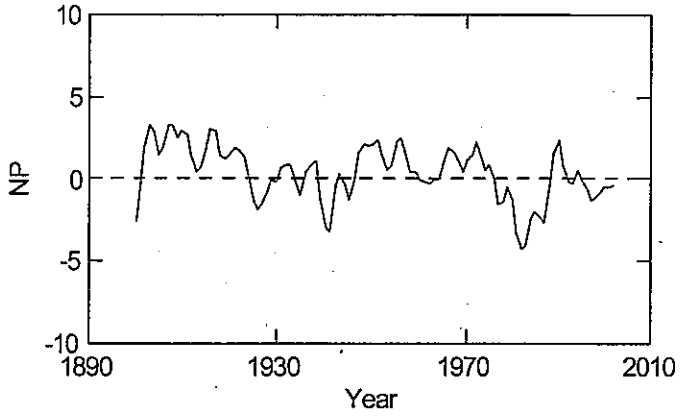

Figure 3 Trend of the November to March NP index from 1900 to 2002. Negative values indicate winters of lower than average air pressure over the North Pacific Ocean, generally warmer winters in the northeastern Pacific and colder in the western Pacific[iii].

Southern Oscillation Index

The Southern Oscillation Index reflects the large-scale atmospheric pressure differences between Tahiti and Darwin, Australia. Strong and persistent negative values are indicative of El Niño events. These are typically accompanied by easterly trade winds and elevated sea temperatures off the coast of western South America. Strong negative values are accompanied by westerly trade winds, cooler ocean temperatures along the eastern tropical Pacific and warmer waters in the western tropical Pacific. This ocean/atmosphere system has a major influence on the global climate and marine ecosystems in the Pacific Ocean. In 1999, the tropical Pacific swung from a strong El Niño in 1997/98 to a strong La Niña in 1999. This dramatic reversal was accompanied by a similar shift in the PDO. In recent months the SOI has tended back toward El Niño but the PDO has persisted at intermediate values.

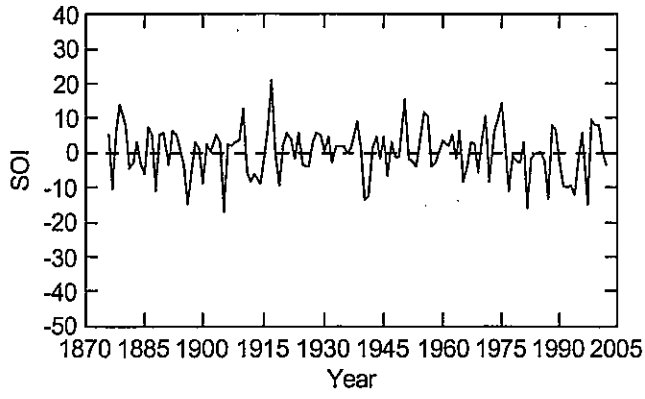

Figure 4 Trend in Southern Oscillation Index [iv].

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Arctic Oscillation Index[v]

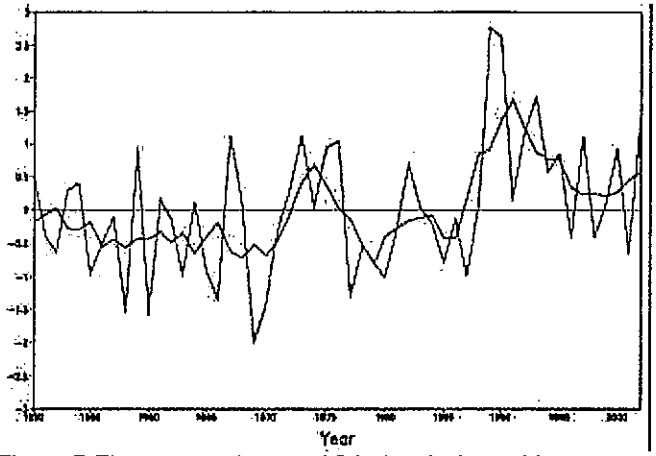


Figure 5 The seasonal mean AO index during cold season (blue line) is constructed by averaging the daily AO index for January, February and March for each year. The black line denotes a five-year running mean of the index. The index is normalized using 1950-2000[v]

The Arctic Oscillation is an index of the dominant spatial pattern of sea level air pressure in the cold months in the northern hemisphere. The shift from low values of the index before 1990 to recent higher values indicates reduced sea level air pressure over the Arctic and increased sea level air pressure in the subtropical latitudes. The timing of the change from generally negative to positive values corresponds to the ecosystem changes in the North Pacific in 1989[vivii]

Atmospheric Forcing Index

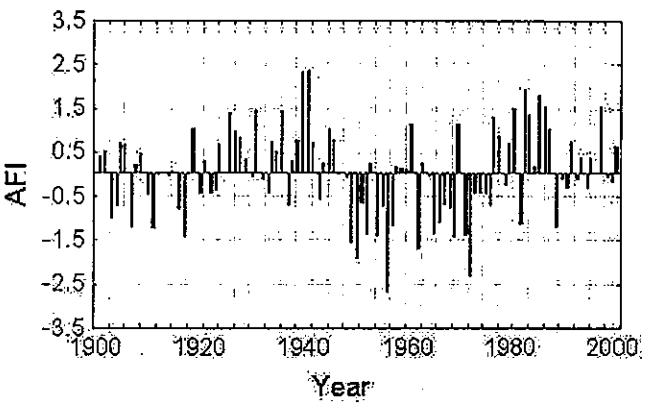


Figure 5 Atmospheric Forcing Index combines the Aleutian Low Pressure Index (ALPI), Pacific Interdecadal Oscillation Index and the northwesterly atmospheric circulation anomalies for the North Pacific (December through March)[vii].

The Atmospheric Forcing Index utilizes standardized scores of the first component from a principal components analysis on the Aleutian Low Pressure Index (ALPI), Pacific Interdecadal Oscillation Index and the northwesterly atmospheric circulation anomalies for the North Pacific (December through March). Positive values represent intense Aleutian lows, above average frequency of westerly and southwesterly winds, cooling of sea surface temperatures in the central North Pacific, and warming within North American coastal waters.

Regional Chapters

Sample report for discussion only

Japan/East Sea

Winter Spring Summer Autumn

Seasonal Temperature Changes in 1993

Background

The Japan/East Sea[1] (JES) is formed by the separation of the Asian mainland on the west and the archipelago of Japan on the east. It spans the latitudinal range from 35°N to 50°N, about the same latitude as Point Conception, California to Vancouver Island, B.C. on the North American side. The coastal states include Russia, North Korea, South Korea from north to south on the mainland and Japan. The Japan/East Sea has several deep basins and is connected with the North Pacific Ocean by shallow and narrow straits at the northern and southern extremes. The major influences include the inflow of warm salty water from the south meeting cool fresher water from the north. The interface between the two is dynamic. Surface ocean currents tend to be northward along the coast of Japan, some water flowing out to the North Pacific through the Tsugaru Strait between the Japanese islands of Hokkaido and Honshu and the La Perouse (Soya) and Tartarsky (Mamiya) straits further north. Locations have multiple names because of the different languages in the region[viii]. Ocean currents on the western side tend to be southward, creating an overall anticlockwise (cyclonic) surface circulation pattern. Deep waters are very cold because of severe winters that create dense, cold water that sinks.

Highlights

The JES has one of the clearest, most unambiguous signals of long-term ecosystem change, yet there is no good answer for why?

Although Pacific sardine once accounted for over 70% of the catch of pelagic species in the JES,[ix] they no longer form a significant fraction of the catch.

The winter distribution of Stellar sea lion has moved southward along the west coast of Hokkaido resulting in increasing interactions between fishermen and the sea lions.

Critical factors causing change

Climate

Strong winter winds associated with cold-air outbreaks from Siberia cause large-scale changes at the ocean surface which have significant effects on the JES. The winter of 2000/2001 was anomalously harsh in this regard.

Status and Trends

Physics and climate

There is mounting evidence that the annual mean temperature of the mixed layer is increasing over large portions of the world ocean[x], although little is known about the long-term behaviour of subsurface

[1] PICES calls this body of water the Japan/East Sea, in consideration of its translation to English from multiple languages in the region.

temperature and salinity in most of the world ocean. For the Japan/East Sea, the nature of changes in the physical state of the JES, as manifested by changes in temperature, is somewhat clearer. Good quality observations at all depths have been collected by the countries bordering the JES since the early 1900s, making the task of examining changes in the JES somewhat more straightforward than for the global ocean.

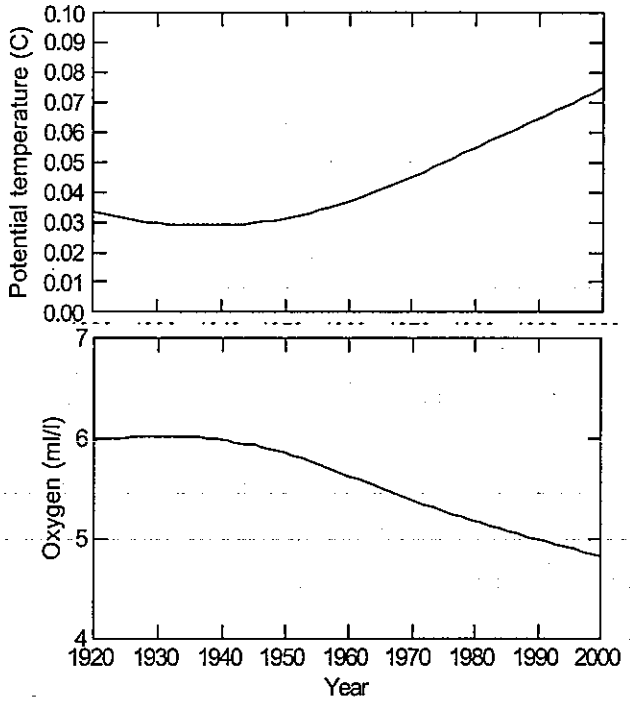


Figure 6 Trends in potential temperature and oxygen at 2500 m depth from 1930 to 1995 averaged over the Japan/East Sea[xi].

Despite considerable variability, it is clear that temperatures in the deeper portions of the JES have been increasing nearly monotonically in the long-term over sizable portions of the JES since the 1930s[xii,xiii]. In some locations, this trend can be seen at depths as shallow as only 250m beneath the surface. In surface waters, the pattern is different. At least in the southern JES, the decadal-scale SST patterns appear to correspond to the path followed by the Kuroshio. The timing of the sudden and persistent decline in SST in the JES in 1963[xiv] corresponds to an equivalently sudden and persistent shoreward shift in the Kuroshio axis in 1963[xv]. Likewise, the sudden and persistent upward shift in water density (sigma *t*) at Station 5 on the PM-line corresponds to a dramatic and persistent offshore shift in the Kuroshio axis in the same year. SST observations in the JES are correlated with those observed in the East China Sea, which in turn is reflected in the path taken by the Kuroshio[xv].

As salinity has been difficult to measure with sufficient accuracy, it is considerably more difficult, if not impossible, to discern trends from these data over similar timescales. Over the last century, air temperatures have been significantly warmer in winter and spring in the mid-latitude regions of the JES with the greatest rate of warming occurring in the cold season[xvi].

In waters deeper than 2000 m there is considerably more evidence of a long-term warming, which appears to be highly correlated with a decrease in oxygen concentration in deep water[xvii]. The concentration of oxygen in the deep waters has decreased by more than 1 ml l^{-1} since the 1930s and the deep potential temperature has increased by 0.5°C over the same period. Since the generally high values of dissolved oxygen in the deep waters of the JES result from wintertime convection along the western coast of the JES, a decrease in oxygen in the deep water (and the corresponding increase in potential temperature) would appear to indicate that the amount of deep convection in winter in the JES must be decreasing over time. Using a simple box model with contemporary measurements of temperature, salinity, dissolved oxygen, and CFCs (chlorofluorocarbons), it was found that by the mid 1990s, less than 1% of the surface area of the JES was subject to deep convection in wintertime[xviii], although this value must have been much higher in the 1930s to account for the high dissolved oxygen in the deep water at that time.

The fact that dissolved oxygen is decreasing in the deep layers of the JES implies that insufficient new, dense, oxygenated water is being formed at the sea surface in winter to match the rate of biological utilization of oxygen in the deep water. If this is indeed the case, then one must inquire as to the reason for the decrease in wintertime convection. A number of hypotheses have been offered including (1) and increase in wintertime air temperature over the western region, (2) a change in the paths of major atmospheric storms in winter, (3) freshening of the surface waters of the JES, (4) changes in the positions of large-scale atmospheric systems in winter over Siberia and the western subarctic Pacific, and (5) changes in the nature of the JES due to increasing human populations around its borders. Since it is now clear that there is a long-term trend of increasing temperature at all levels of the JES, it is imperative to begin to understand the cause of this change and the specific mechanisms that are driving it.

There is new *in situ* evidence that, at least in the winter of 2000-2001, deep convection occurred in the western Sea. Measurements showed unmistakable wintertime convection occurring off Vladivostok[xix,xx]. This was by far the best-documented case of wintertime convection and deep water renewal. The results suggest that deep convection has not stopped altogether, however it is impossible to estimate the areal extent of the convective region or whether it is large enough to begin to replenish the dissolved oxygen in the deep water. Again, a simple model suggests that considerable deep convection must occur over many winters for the dissolved oxygen values to increase and the potential temperature to decease back to pre-1960 levels in the deep water. Whether or not this will occur is unknown, and only sustained, high quality observations of the physical processes at all depths of the JES in wintertime in the coming years will help to understand this problem.

Chemistry

The chemical properties of water in the JES have been measured for many years. Unfortunately these properties are difficult to measure so methods and accuracy have changed over the years, making comparisons of measurements over the long term difficult to interpret. Recent measurements, however, indicate that the chemical properties of the JES are more similar to the chemical properties of the East China Sea than to other regions in the western subarctic Pacific[xxi]. This likely reflects that the major source waters, the Tsushima Current, originate in the East China Sea. In contrast, the Okhotsk Sea is another major marginal sea in the western Pacific but it is more similar to the western subarctic Pacific. The JES is exhibiting some of the classical signs of eutrophication, including increasing nutrient concentrations (perhaps from local rivers as well as the East China Sea) and reduced oxygen concentrations in deeper waters.

Sampling along the PM line in the southeastern JES by the Maizuru Marine Observatory of JMA has revealed decadal-scale variation in the JES ecosystem. From 1982 to the early 1990s, surface mixed layer phosphate concentrations were high in winter and low in spring indicating that nutrient depletion occurred earlier than before or after this period. Water density profiles indicate that water column stability was stronger during these years, suggesting that nutrient supply to the surface waters was more restricted during this period.

Plankton

Phytoplankton The basis of most biological production begins with transformation of sunlight and nutrients by phytoplankton. Throughout the winter, light levels are often too low to promote rapid increases in the abundance of phytoplankton. Although light at the ocean surface may be sufficient for growth, the deep circulation of ocean water in wintertime, caused by strong winds and cold water temperatures, takes the phytoplankton cells away from the light. Only when the sea surface temperatures warm in spring and vertical circulation is restricted to the surface layers, can phytoplankton grow and multiply. Because of their pigments (e.g. chlorophyll), the colour of the ocean is changed with increasing abundance. Since 1978, it has been possible to measure the amount of chlorophyll at the ocean surface with ocean-colour sensing satellites.

Various satellites with different sensors have been used over the years, often making it difficult to compare some results among sensors. Interference from clouds also limits the ability of satellites to measure chlorophyll, as does contamination by factors other than chlorophyll that can affect ocean colour.

Satellites cannot distinguish which species are responsible for the chlorophyll nor can they see beneath the surface. Nevertheless, some salient features of surface plankton growth are revealed. Comparing Aprils of 1998-2002, it is immediately apparent that there are both annual and spatial differences in chlorophyll distribution throughout the JES. At this time of year, there is a large region of chlorophyll minimum in the central northern JES and this feature is conspicuous in all years. The southwestern coast of Sakhalin and the Primorye coast appear to have the highest chlorophyll concentrations in all years.

Sample report for discussion only

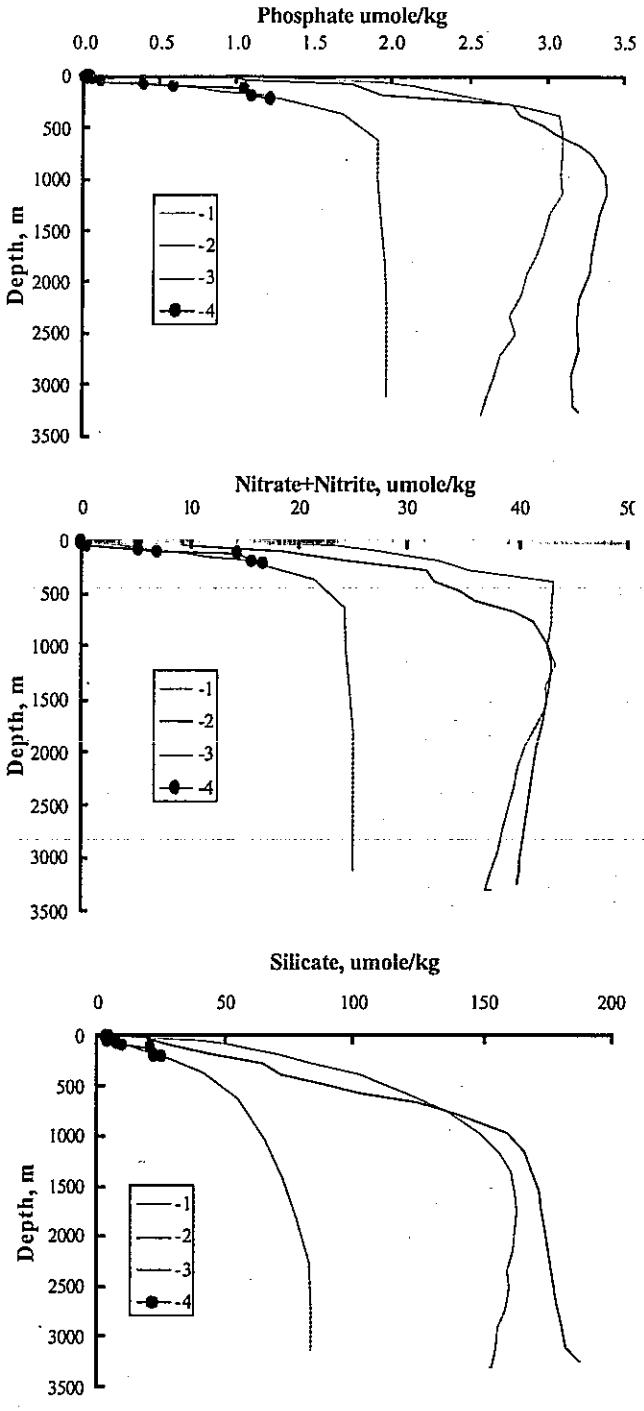


Figure 7 Concentrations of nutrients (phosphorus, nitrogen, and silicon) by depth in the East China Sea (?), Japan/East Sea (-), Sea of Okhotsk (-), and western subarctic Pacific (-)

Sample report for discussion only

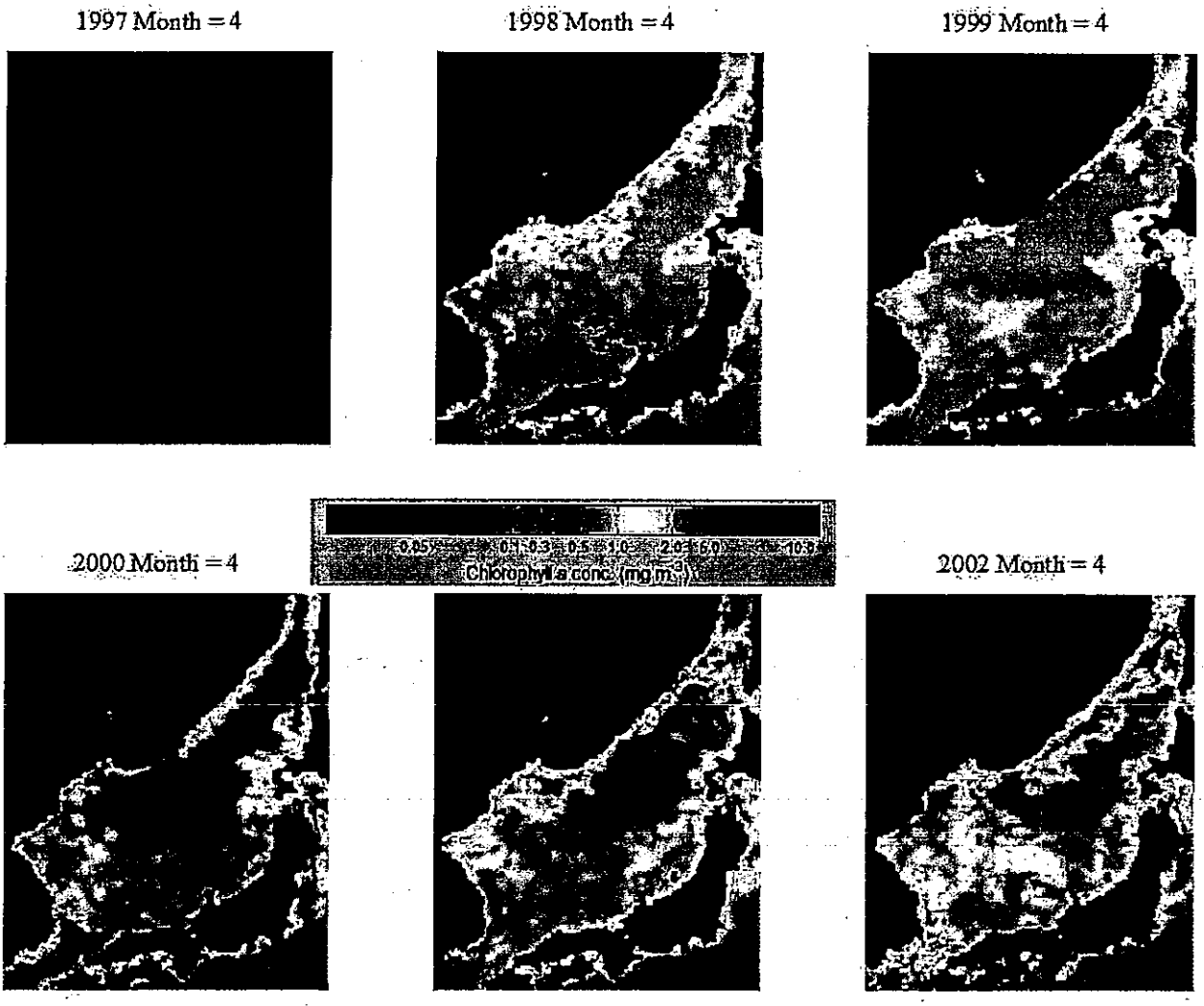


Figure 8 Spatial patterns of surface chlorophyll (mg/m^3) in the Japan/East Sea in April, 1998 to 2002[xxii]

The timing of chlorophyll blooms at the ocean surface varies seasonally and annually. The JES has both spring and fall blooms that vary in timing and magnitude. The spring bloom begins in the south and progresses northward and its timing can vary by up to 1 month. The bloom also starts along the Russian coast of Primorye and moves seaward as spring progresses. Comparing chlorophyll concentrations with JMA meteorological buoy data indicated that stratification had developed by the onset of the spring bloom. A particularly early spring bloom in 1998 occurred when winds were lower and insolation higher than in other years. The geographic pattern for the fall bloom is less regular but it occurs almost simultaneously from south to north. Melting sea ice in Mamiya (Tartar) Strait between Primorye and the west coast of Sakhalin is responsible for freshening the surface waters in the region. When combined with seasonal warming in spring, a less dense surface layer increases water column stability and allows for the development of the spring bloom in that area.

Over the short period of record described here, there is no apparent trend. Longer timeseries are available but attempts to interpret these properly are challenged because of difficulties with the precision and accuracy of colour sensors and their intercalibration.

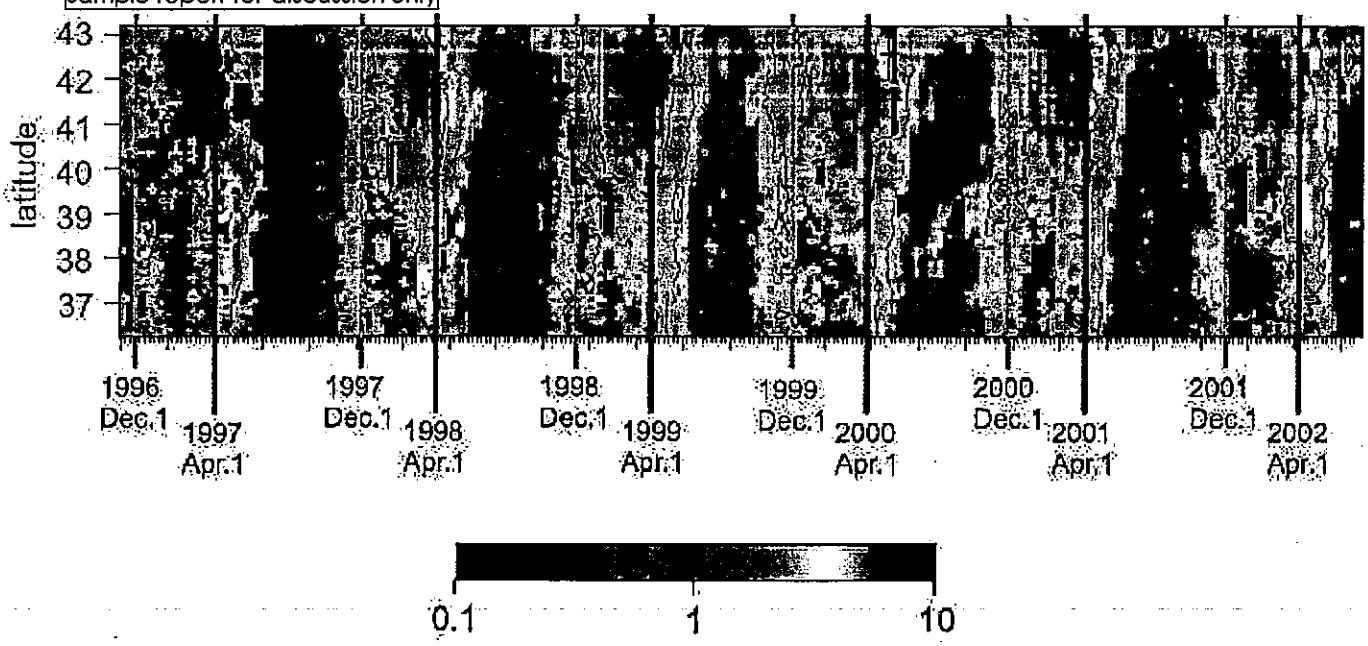


Figure 9 Time series of chlorophyll along 134° 33' E longitude from OCTS and SeaWIFS satellites. Vertical lines at fixed dates show differences in bloom timing among years. The larger peak in April 1997 may be due to differences between sensors (OCTS and SeaWiFS). A Japan Meteorological Agency buoy was located on this longitude at 37°55'N[xxiii]

Zooplankton Warm water species are present in regions of the JES that are under the influence of the Tsushima Current (a branch of the Kuroshio Current) that flows from the East China Sea into the southern JES between Korea and Japan. Subarctic species inhabit the northern JES where subarctic-origin water dominates. So the JES includes a mixture of warm and cold water species. A total of 30,098 samples were collected by vertical net hauls (0.33 mm mesh) from 150m to the surface from 1966-1990. These indicated that the average biomass in the coastal areas had minimum values in daytime sampling in winter (< 50 mg m^{-3}) and peaked in June (125 mg m^{-3}). In the offshore, the mean biomass was greatest in April (day/night: 72/147 mg m^{-3}) and lowest in winter. Day/night differences were greatest in 1976/77 and 1983/84. The highest annual mean values were associated with areas north of the subpolar front.

Although the colder regions of the JES are distinguished by higher zooplankton concentrations, there is lower species diversity. The small and medium size fractions, largely copepods and younger stages of larger species, are food for larger zooplankton and fish larvae. The larger fractions include large copepods, hyperiids, euphausiids and chaetognaths. The latter are the main zooplankton predators.

Fish and Invertebrates

Common squid (*Todarodes pacificus*), the sardine (*Sardinops melanostictus*), chub mackerel (*Scomber japonicus*), horse mackerel (*Trachurus japonicus*), anchovy (*Engraulis japonicus*), yellowtail (*Seriola quinqueradiata*), snow crab (*Chionoecetes opilio*) and walleye pollock (*Theragra chalcogramma*) are major targets for commercial fisheries in the JES. Common squid and the sardine are the most important target species, so they have been the focus of many life history and stock-assessment studies over many years.

Japanese sardine occur throughout the JES when they are abundant. Spawning grounds exist along most of the western shore of Honshu and the fishing grounds are along all coastal margins. Fishing in the north is seasonal, taking place primarily during the summer and fall, whereas fishing in the south occurs year-round. The abundance of sardines has fluctuated dramatically in the past and is currently at very low levels.

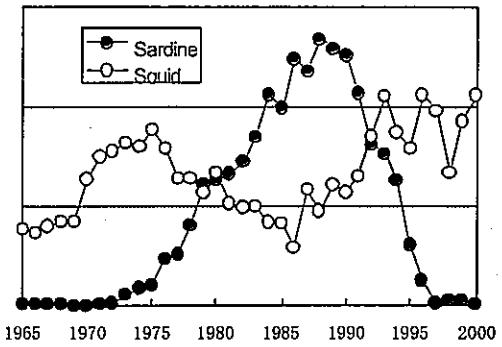


Figure 10 Total catch of common squid by Japan and Korea and Japanese sardine by Japan.

Common squid are particularly abundant around the main Japanese Islands, in both warm and cold waters. The migration routes and spawning areas of common squid in the JES vary with abundance. In autumn, common squid usually undergo a southward spawning migration. In the 1970s, adult squid usually migrated westward along the northern edge of the sub-arctic front to an area east of Korea, and then migrated southward to spawn in the East China Sea. But in the 1980s, adult squid often migrated southward to the coast of Honshu Island, crossing the sub-arctic front. In the 1990s the migration route returned to the pattern observed in the 1970s. The main countries fishing for squid in the Japan/East Sea are Japan, North Korea and South Korea. Assuming that catches are correlated with abundance, it appears that common squid abundance is maintaining a relatively high level and there is some indication of an inverse abundance relationship between common squid and sardine.

In the Russian zone, chub mackerel were known to appear as far north as the coast of Primorye at the beginning of 1920s but annual catches did not exceed 25 t. In the 1930s larger catches indicated that the species was present in greater numbers. Increased abundance in during the 1940s allowed a specialized fishery to operate. Catches steadily increased until 1951 when catches exceeded more than 10,000 t in Primorye. However at the end of the 1950s, chub mackerel catches decreased and the fishery became unprofitable. Strong year-classes at the beginning of the 1990s were reflected in sharp in short-term increases of mackerel catch near the coast of the Korea peninsula and the appearance of mackerel eggs in the more northern part of its range in 1996.

Japanese anchovy appeared in Primorye waters at the beginning of the 1920s, but fishing was limited to incidental catches of about 200-300 kg per day. Systematical catch data have been collected in Russia since 1944 as fisheries reacted to an earlier collapse of the sardine population. In the 1960s anchovy catches reached 16.8 t annually. During this period, anchovy were spawning in southern Primorye but from the middle of the 1970s, the abundance of anchovy in the Russian zone declined. In the 1990s, anchovy were the first species that reacted to changes in nekton. One to two year old anchovy accounted for 30% of the bycatch during sardine expeditions in the open waters of the Russian 200-mile zone in 1989. The high level of anchovy stocks and active spawning in northern regions has placed anchovy in the leading role in ichthyoplankton surveys of the JES during the last years.

Hokkaido-Sakhalin herring were once very abundant. A peak catch of 972 thousand t occurred in 1897. Catches gradually declined and by the 1950s herring were no longer spawning in the region.

Konoshiro gizzard shad (*Konosirus punctatus*) were rare in Russian waters until 1996, but since then the spawning of gizzard chard has been increasing in the coastal waters of northwest part of the JES. Eggs and larvae of this species and anchovy were numerous and in some years it practically dominated in ichthyoplankton samples.

Japanese and Korean fisheries harvest Pacific salmon in the JES, while Russian fisheries operate in rivers. Pink salmon (*Oncorhynchus. gorbuscha*) are the most abundant species of Pacific salmon in the JES. Unlike chum salmon (*O. keta*) they remain in the JES and become vulnerable to fisheries in the JES. Masu salmon (*O. masou*) are also resident in the JES but in far fewer numbers. Catches of pink salmon declined during the early part of the 1990s. Long time series of historical catches in Russia indicate that pink salmon catches were higher during first half of the 20th century than in the latter half.[xxiv]

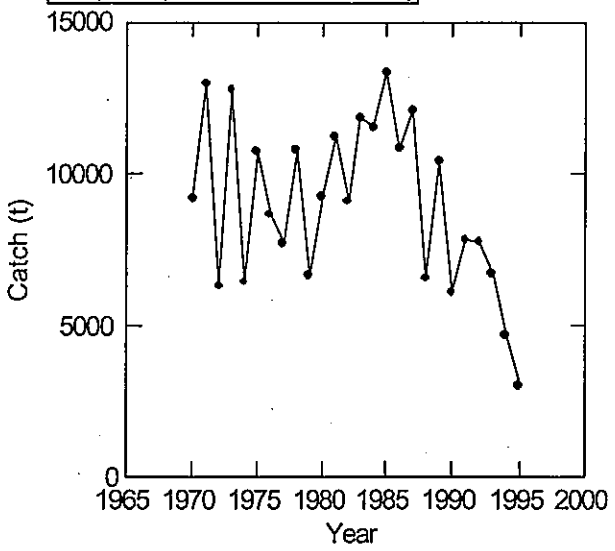


Figure 11 Total catch of pink salmon in the Japan/East Sea by Japan, South Korea and Russia[xxiv].

Chum salmon (*O. keta*) are released in large numbers from Japanese hatcheries located as far south as Ishikawa Prefecture (~36.5°N). The number released in recent years is of the order of 200 million fry.[xxv] The mean fry to adult survival for these fish (0.32%) is about one tenth that of chum salmon released from hatcheries in Hokkaido and lower than that found on the Pacific side of Honshu. It appears that the years of best survival occurred before the 1976/77 regime shift. Chum salmon survival was negatively correlated with SST in May off Fukura (~39°N) in Yamagata Prefecture.

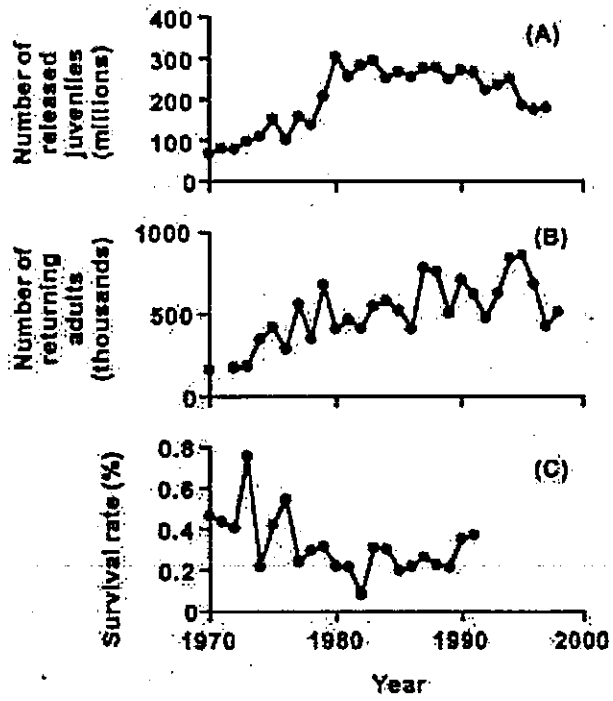


Figure 12 Annual numbers of juvenile chum salmon released from hatcheries in Honshu, the numbers of adults returning and their survival[xxv]

Catches of masu salmon (*O. masou*) in Japan have declined since 1973. Prior to 1973, they were included in catches of pink salmon.

Seabirds

Studies of seabirds populations on Teuri Island (Hokkaido) have been conducted since 1984. The diets of black-tailed gull (*Larus crassirostris*), rhinoceros auklet (*Cerorhinca moncerata*) have been conducted since 1984 and Japanese cormorant (*Phalacrocorax capillatus*) since 1992. Gulls and auklets foraged on Japanese sardine when they were abundant during the 1980s. The diets changed abruptly with collapse of the Japanese sardine population in the early 1990s. The rising abundance of anchovy in 1992 was reflected in the seabird diets, particularly rhinoceros auklet. Black-tailed gulls initially switched from sardine to sandlance, although with increasing fractions of anchovy beginning in 1998. The role of the Tsushima Current on seabird diets is an active area of investigation.

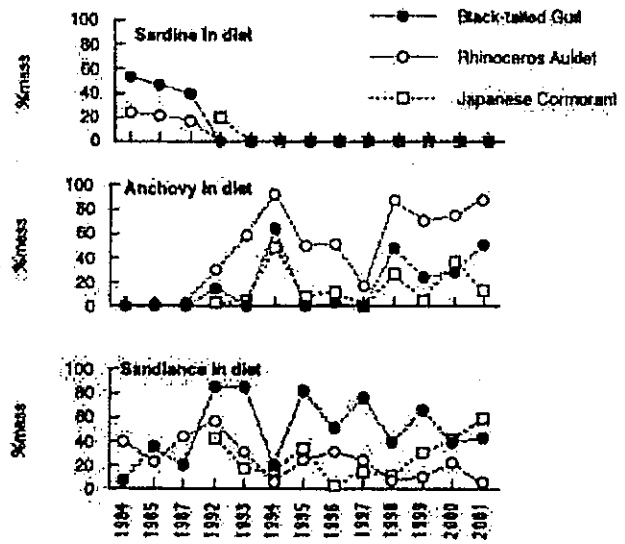


Figure 13 Year to year changes in diet composition of seabirds breeding on Teuri Island (Hokkaido)

Slaty-backed gull (*L. schistisagus*), black-tailed gull and Japanese cormorant were observed in the Syokanbetsu River (Hokkaido) estuary eating juvenile chum salmon (*O. keta*) in April 1999 after the fry were released from the hatchery. The increased abundance of gulls in the estuary during this period was dramatic[xxvi].

Marine mammals

Pinnipeds Largha seals (*Phoca largha*) aggregate in Peter the Great Bay (Primorye, Russia) to mate and to molt. Early records of largha seal catches suggest that its abundance in Peter the Great Bay in the 19th century may have been as high as several thousand, decreasing considerably by the 1930s[xxvii]. The local population size was recently estimated to be about 1,000 individuals with further growth limited by incidental take in the trap net fishery.

Cetaceans No reports.

Issues

Key questions and data requirements

Better models are required to investigate forcing mechanisms. There is an urgent need to maintain observations, as several scientific programmes in the region are ending.

The physical processes that are responsible for stratifying the water column are the most critical for primary biological production in the JES. The strength and timing can be monitored by satellite using ocean colour data, and with careful calibration of new data and recalibration of archival data, it may be possible to make better use of historical satellite observations.

How is stratification controlled? To determine this there is a need for monitoring programs in the JES, particularly now that the JMA buoy has been terminated.

Satellites cannot sense subsurface chlorophyll so it is important to understand the dynamics of the subsurface chlorophyll maximum to determine its role in important primary production in the JES? How is the physiological parameter of primary production controlled.

Can satellites accurately estimate magnitude of primary production during short blooms. There is a need for *in situ* optical monitoring from buoys.

How is the LTL foodweb in the JES structured? To begin to answer this, there is a need for size fraction data and information on functional groups.

Long-term study was based on small datasets (3 stations, 4 times/yr): Extensive monitoring program including satellite observation. Minimum of 1 station in north and 1 in south.

Long timeseries of zooplankton samples from 150-surface may not adequately represent long-term trends because of the deep diel migrations of some of the dominant species.

Threats

The frequency of red tides and ichthyotoxin incidents in the JES is increasing. In fact, during the CREAMS/PICES 2002 workshop in Seoul, one of the largest outbreaks of the fish killing alga, *Cochlodinium polykrikoides*, occurred of southern and eastern Korea and resulted in huge losses of farmed fishes. Outbreaks of this and closely related species seem to be predominantly problems in Korea (where it is the main source of severe losses)[xxviii].

The former Soviet Union and, now Russia, have reportedly dumped radioactive waste in the JES since the 1950s, threatening marine flora and fauna and potentially human health because of radioactive contamination of seafood. Few studies of the effects have been conducted[xxix]

Contributors

Much of the information contained in this chapter was presented at the CREAMS/PICES Symposium on *Recent Progress in Studies of Physical and Chemical Processes in the East/Japan Sea and their impact to its ecosystem* held 22-23 August, 2002 at the HOAM Faculty Club of Seoul National University in Seoul, Korea. A half day for discussion and synthesis was organized by PICES on the morning of 24 August.

Physical oceanography: **Steven Riser** (University of Washington) was largely responsible for the text.

Nutrients: **Sanae Chiba** (JAMSTEC), **Pavel Tischenko** (Pacific Oceanological Institute)

Remote sensing/chlorophyll: **Joji Ishizaka** (Nagasaki University), **Sinjae Yoo** (KORDI), and **Sanae Chiba** (JAMSTEC)

Zooplankton: **Sanae Chiba** (JAMSTEC), **Natalia Dolganova** (TINRO) and **Naoki Iguchi** (Fisheries Agency of Japan)

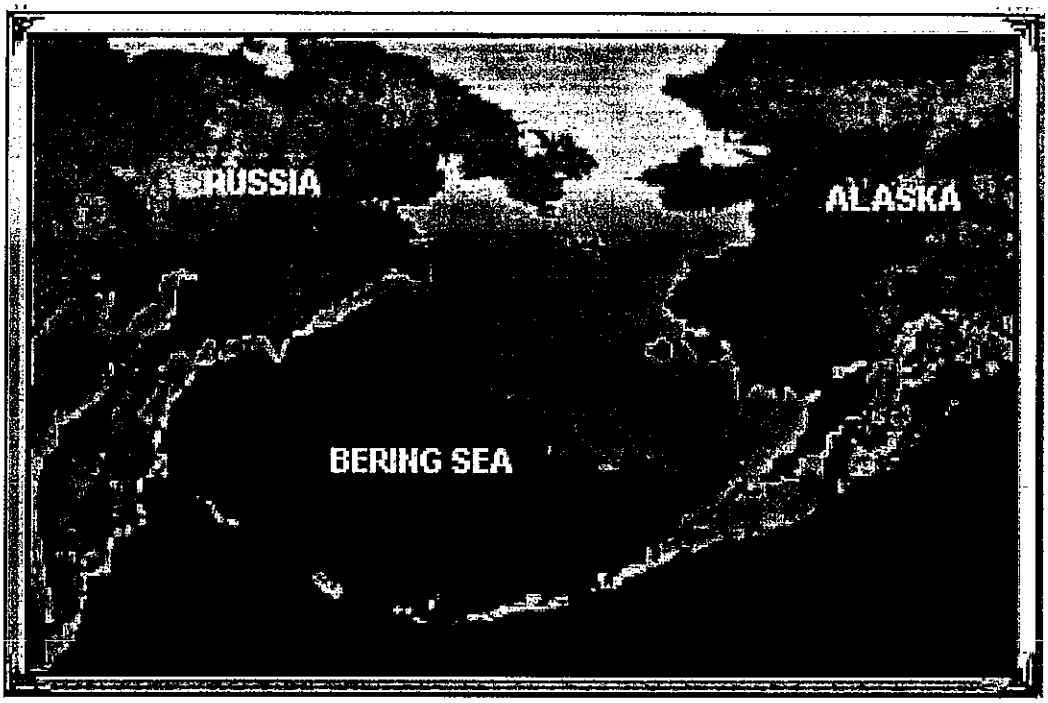
Fishes: **Svetlana Davidova** (TINRO) and **Hideaki Kidokoro** (Fisheries Agency of Japan); **Skip McKinnell** (PICES) for Pacific salmon only.

Seabirds: **Yutaka Watanuki** (Hokkaido University)

Marine mammals: **Yasunori Sakurai** (Hokkaido University) and **Alexei Trukhin** (Pacific Oceanological Institute).

Sample report for discussion only

Bering Sea/Kamchatka



Background

The Bering Sea – Kamchatka region is a semi-enclosed high latitude sea. It has a deep basin (3,500 m) and shallow (<200 m) continental shelves, with a broad shelf (>500 km wide) in the east contrasting with a narrow shelf (<100 km) in the west[xxx]. In summer, three domains (coastal, middle, and outer) can be distinguished on the eastern shelf by their hydrographic conditions and circulation patterns. These domains are separated by fronts, which constrain the cross-shelf exchange of properties and are important locations for ecosystem interactions. As it is a high latitude system, there are large seasonal differences in solar radiation, wind forcing, and sea ice. The region is connected to the North Pacific through the Aleutian island arc and has a shallow connection with the Arctic Ocean through the Bering Strait. The region can be considered as a continuation of the North Pacific subarctic gyre, with water from the Alaska Stream in the Gulf of Alaska flowing into the eastern Bering Sea, moving counter-clockwise to the western Bering Sea, and exiting through Kamchatka Strait[xxxi]. The long-term mean summer bottom water temperature on the eastern Bering Sea shelf is 2.4°C; and the long-term mean summer surface temperature is 6.6°C.

The Bering Sea – Kamchatka region has very high biological productivity, but it is strongly seasonal. Over 266 species of marine phytoplankton have been identified in the Bering Sea phytoplankton community, comprising 8 taxonomic classes[xxxii]. Rates of primary productivity up to 225 g C m^{-2} yr^{-1} have been reported from the most productive areas[xxxiii]. Over 300 species of zooplankton occur in the Bering Sea, with copepods, coelenterates, and amphipods the most abundant taxa. Zooplankton biomass production is also strongly seasonal and varies regionally, with estimates up to 64 g C m^{-2} yr^{-1} from the shelf edge in the eastern Bering Sea to 4 g C m^{-2} yr^{-1} for the coastal domain[xxxiv]. The region includes more than 450 species of fish and invertebrates, of which about 25 are commercially important. Forage fishes such as capelin (*Mallotus villosus*), eulachon (*Thalichthys pacificus*), deep sea smelts (Bathylagidae), myctophids, Pacific sand lance (*Ammodytes hexapterus*), and Atka mackerel (*Pleurogrammus monopterygus*) and juvenile cephalopods can be locally abundant. They are significant prey items of larger cephalopods, fishes, marine mammals and seabirds[xxxii]. Most important among the commercial species are groundfishes such as walleye pollock and flatfishes, and several species of

crabs and Pacific salmon. With such high primary and secondary production, some commercially important species can reach very high abundances; in 1998, catches from this region comprised about 50% of all fish landings in the U.S.. Most commercial populations of fishes and crabs have exhibited cyclic changes in abundance, at least over the period of recent observations (since the 1970s). The high biological productivity of the region also supports rich assemblages of marine birds and mammals (38 species of seabirds, and 25 species of mammals)[xxxii]. Marine birds and mammals have low reproductive rates, low annual mortality, and long life spans. For seabirds, changes in population trends for those species examined have generally been attributed to changes in productivity rather than changes in survival[xxxii]. The past 30 years have seen large changes in the ecosystem of the Bering Sea – Kamchatka region, with dramatic changes in abundances of salmon, crabs, and groundfishes; declines in marine birds and pinnipeds, which have lead to fishery closures; unusual distributions of whales; and recent novel blooms of unusual phytoplankton and zooplankton. The final Ecosystem Status Report is intended to include the entire region, however, this draft report will focus on recent conditions in the eastern Bering Sea.

Highlights

Oceanographic and ecosystem dynamics are dominated by sea ice (annual extent, duration, timing), which is sensitive to climate variations.

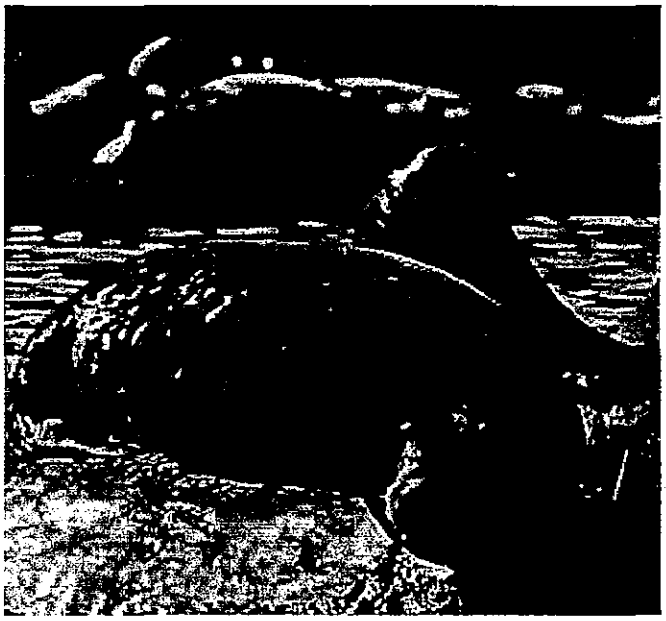
The region is known for high biological productivity that is strongly seasonal. Some of the largest fisheries in the U.S. occur in the eastern Bering Sea.

Sea water temperatures have been cooling through the 1990s although it was warmer in 2001 due to less sea ice that was the result of unusual wind patterns.

The eastern Bering Sea has experienced unusual blooms of both phytoplankton and zooplankton. Coccolithophore blooms have occurred during summer since 1997. Large jellyfish have become increasingly abundant through the 1990s, and have the potential to adversely affect juvenile walleye pollock (by competition and by direct predation).

Major shifts in abundance of fish and invertebrate populations occurred over the past 20 years although recently, groundfish populations appear to have stabilised. Catches of Pacific salmon continue to decline.

There are concerns about declines in Stellar sea lions and northern fur seal populations, and unusual distributions of endangered whales. Reproductive success of piscivorous seabirds been above average in recent years.



Significant issues for this region include the effects of climate warming, novel phytoplankton and zooplankton blooms, interactions of commercial fishing with bottom habitats, and marine mammals.

Critical Factors Causing Change

The most significant proximate factors causing changes to the marine ecosystems of eastern Bering Sea are sea ice and fishing. The role of sea ice, its annual extent and duration, is central to the functioning of the ecosystem. Sea ice affects the timing, amount, and fate of primary production, the hydrographic (temperature and salinity) properties and the strength of vertical stratification, and the spatial distributions of marine predators and prey.

The timing of the spring bloom is related to the presence of sea ice: if ice is present in mid-March or later it will trigger a strong phytoplankton bloom; if ice is not present in the spring, the phytoplankton bloom will occur later (e.g. in May) once the water column has stratified[xxiv]. The edge of the sea ice also has important influences on local phytoplankton production. In turn, sea ice is sensitive to variations in meteorological conditions, such that small variations in wind velocity and direction can greatly affect the extent, timing, and duration of ice. The locations of the Arctic High and Aleutian Low pressure regions governs the paths and intensities of the storms that impact the Bering Sea, particularly in winter. This region is therefore quite sensitive to low-frequency climate variations and change. Large-scale climate processes that influence the Bering Sea include those that are indexed by the Arctic Oscillation (AO) and the Pacific North America (PNA) pattern (which correlates with the Pacific Decadal Oscillation).

The predominant direct human forcing on the eastern Bering Sea is fishing. The amount of fishing effort (measured as bottom trawling time) increased in 2000 compared with 1999, and the total number of vessels fishing also increased, although total recent effort is less than that for 1991-1998. There was more bottom area closed to trawling in 2000 than in 1999, which had the effect of concentrating trawling in those areas open to fishing[xxv].

has been increasing during the 1990s. Year 2001 was unusual in being a very low sea ice year, mostly due to strong southerly winds that kept the ice north of 60°N[xxv]. Sea ice also disappeared early in 2000 and 2001.

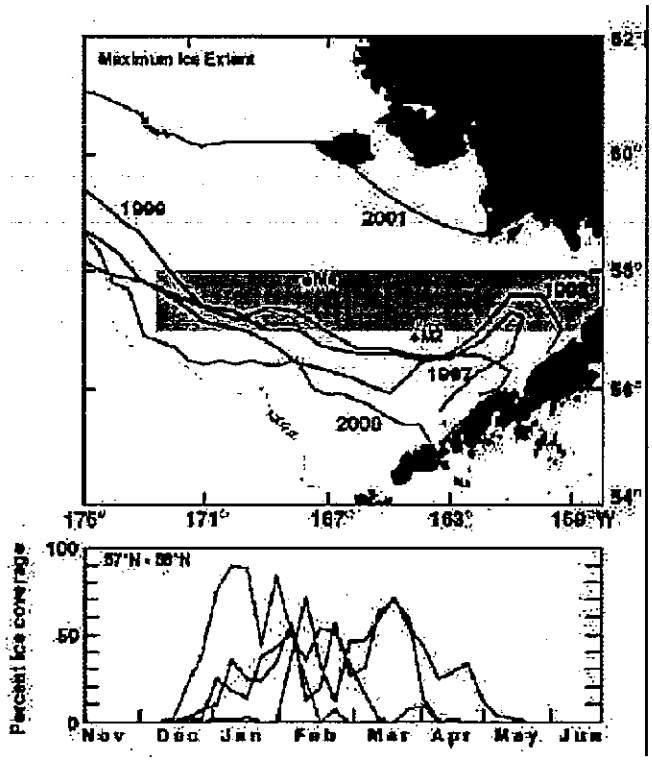


Figure 14 The extent (upper panel) and timing (lower panel) of ice cover in the eastern Bering Sea in recent years.

Status and Trends

Hydrography

Sea ice in the Bering Sea has shown decadal-scale variability. There was less ice and warmer temperatures after the late 1970s, although the amount of sea ice

Mean annual SST at the inlet passes into the southeast Bering Sea shelf has been decreasing through the 1990s. In 2001, however, as a result of the unusual winds and the lack of ice on the shelf, summer bottom temperatures were slightly warmer and surface temperatures cooler than average[xxv].

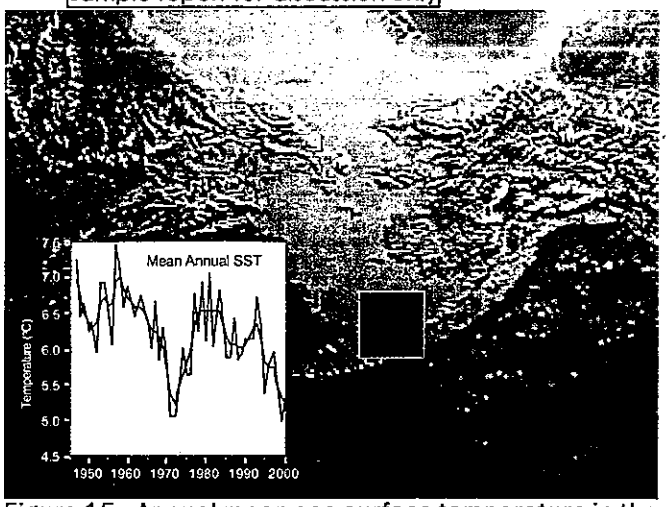


Figure 15. Annual mean sea surface temperature in the Aleutian passes.

Chemistry

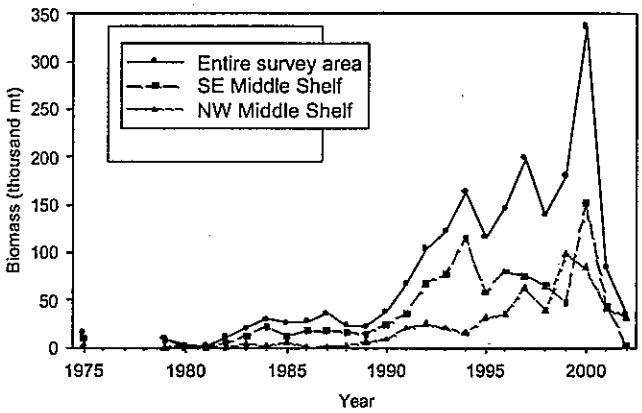
No data

Plankton

The spring phytoplankton bloom occurred later in spring in 2000 and 2001, as a consequence of the early retreat of ice from the eastern Bering Sea. Unusual, and sometimes very large, coccolithophore blooms have been observed on the eastern Bering Sea shelf each year since 1997. They occurred again in 2001, although not as intense as previous years.

Figure 16 Satellite image of coccolithophore bloom in 2000

The most striking changes in zooplankton are associated he huge increases and sudden decline in



biomass of gelatinous zooplankton (jellyfish) since 1989. Most of this increase was due to the large scyphozoea *Chrysaora melanaster*[xxxvi]. The catch of jellyfish during the summer surveys in 2000 were the highest recorded, with an estimate for the area surveyed of 336,673 t, although the densities were highly variable on local spatial scales. Abundance has dropped dramatically in the most recent years.

Fish and Invertebrates

Major shifts in demersal fish and benthic invertebrates began in 1980[xxxv]. There were strong increases in the biomass of walleye pollock, Pacific cod, rock sole, and non-crab benthic invertebrates (echinoderms, molluscs, sponges, ascidians). Pollock and cod had low biomass in the cold period 1971-1976, increased after 1976, but in the 1990s have been variable and slightly below that during the 1980s. Research vessel estimates for 2001 indicate a 19.5% decrease of pollock biomass from year 2000, and an increase of 57% for Pacific cod. Rock sole were observed to have extended their range through the 1990s, at the same time as arrowtooth flounder increased in abundance[xxxv].

In 2000, the total estimated biomass of commercial groundfish species was about the same as in 1999, with walleye pollock the dominant species. The total commercial catch biomass in 2000 was about the same as in 1999, also with walleye pollock as the dominant species. Generally, groundfish recruitment was estimated to be below average[xxxv].

Catches of chinook salmon, sockeye salmon, and coho salmon have declined since the mid-1990s, whereas catches of pink salmon are relatively stable. Catches of chum salmon peaked in 2000, and have declined markedly since.

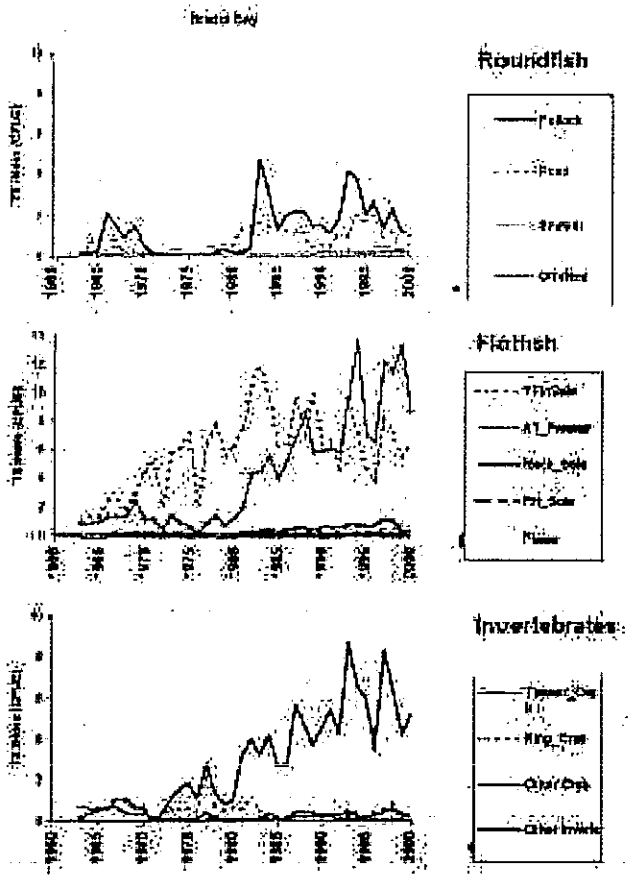


Figure 17 Timeseries of commercial fisheries in Bristol Bay.

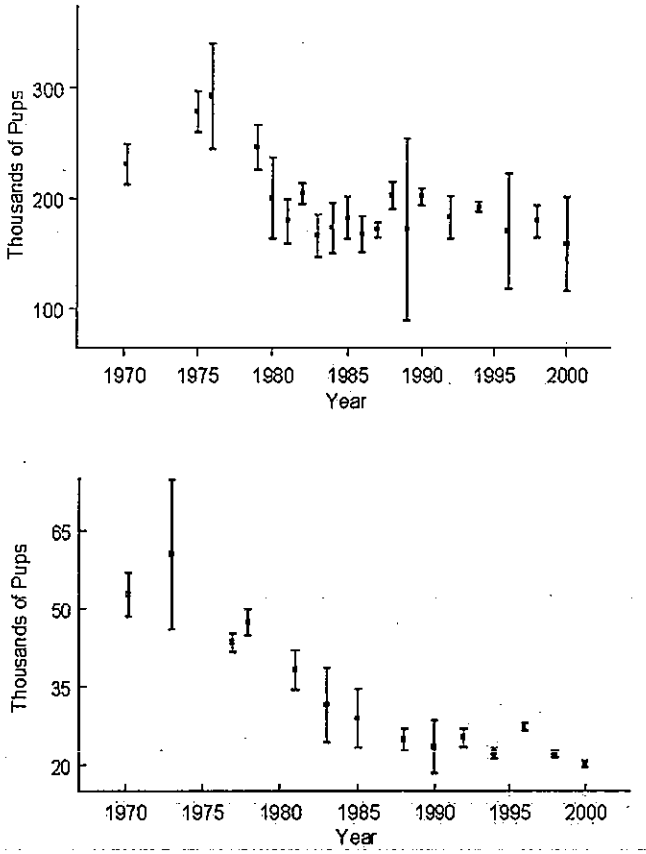


Figure 18 Counts (mean and standard error) of northern fur seal pups at rookeries on St. Paul (A) and St. George (B) Islands, Pribilof Islands (York and Kosloff, 1986; Loughlin et al., 1994; NMFS, Unpubl. Data). Note rapid declines between 1976 and 1984[xxxvii]

Marine Mammals and Seabirds

Stellar sea lions live predominantly along the Aleutian island arc, but some also occur in the Bering Sea. Through the 1990s the abundance of this species has been declining by 2-8% per year, and the cause is the subject of intense investigation. Northern fur seals (*Callorhinus ursinus*) are found throughout the northern North Pacific but breed only at the Commander and Pribilof Islands. Seventy-four percent of the world population breeds on the Pribilof Islands. The number of northern fur seal pups has been declining since 1975.

It is estimated that 40-50 million seabirds live in the eastern Bering Sea, and summer migrants add another 30 million. In 2000, seabirds began nesting earlier than average, in contrast to 1999 when nesting began later. The reproductive success of piscivorous birds was generally better than average in 2000 whereas it was about the same in 2000 as in 1999 for planktivorous birds.

Issues

Climate warming

How will this system respond to global warming? Changes forecast for the Bering Sea include decreasing numbers of storms (less ocean mixing), leading to reduced nutrient levels, less sea ice, and higher sea temperatures. Ecosystem changes observed over the past 5 years include major coccolithophore blooms, high mortality of shearwaters in 1997, reduced salmon abundance, and unusual whale distributions[xxxviii].

Novel phytoplankton blooms

The coccolithophore blooms have occurred annually since 1997, whereas they had not been observed prior to 1997. The cause(s) of the blooms are unknown but they alter the carbonate chemistry of the water and may increase dimethylsulfate production[xxxviii]. They may also replace the small flagellates that are normal dominant

in summer. Since these blooms are readily observed by satellite, they affect light penetration in the ocean, with unknown consequences for other organisms.

Jellyfish abundance

The abundance of gelatinous zooplankton increased substantially after 1989. The dominant species are both predators on, and competitors with, juvenile stages of commercial fishes such as walleye pollock. These medusae can have an effect on zooplankton abundance that is greater than that of age 0 walleye pollock. Competition with jellyfish for food may have a negative impact on the biomass of walleye pollock. The increase in jellyfish abundance may be due to a release from predation by planktivorous forage fishes[xxxvi]. After peaking in 2000, substantial reductions in jellyfish abundance have been observed.

Interactions of trawling with benthic habitat

An ecosystem-based approach to the management of groundfish fisheries which interact with other benthic species is being adopted in Alaska[xxxix]. This includes closing areas of critical habitat to fishing, and careful monitoring of the effectiveness of these closures and the impacts of displacing effort to other locations.

Marine mammals

The decline of Stellar sea lions in Alaska is presently the subject of intense investigation, in particular to identify any potential negative impacts of fishing for walleye pollock, an important prey species of the sea lions. Unusual distributions of endangered North Pacific right whales (*Eubalaena japonica*) have been identified over the past 5 years, with a shift to shallower waters on the shelf and different prey species[xl]. This may make such endangered species more susceptible to ecosystem changes.

Contributors

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Sample report for discussion only

California Current

Background

The California Current System extends 3000 km from Baja California Sur to the northern tip of Vancouver Island in British Columbia. It includes a relatively narrow continental shelf (depths < 200 m) which is widest (~ 100 km) off southern Vancouver Island. Typical seasonal values of temperature and salinity range from 7-14 °C and from 28-31 psu off British Columbia to 34 psu off southern and Baja California. The two major sources of freshwater are the Columbia and Fraser rivers. Ocean circulation tends to be driven large-scale currents and winds. The southward flowing California Current dominates the upper layers, whereas the northward flowing California Countercurrent occurs between 200-400 m depth along the entire region. In fall and winter, equatorward flow of the surface layers reverses to poleward flow as the Davidson Current. The entire region experiences either direct or indirect effects of El Niño – Southern Oscillation (ENSO) events, as well as decadal-scale variability associated with regime shifts.

Fishery resources include invertebrate populations, especially in the near-shore waters, important groundfish populations along the continental shelf, and large and highly migratory pelagic species such as Pacific salmon, Pacific sardine (*Sardinops sagax*), Pacific hake (*Merluccius productus*), Pacific herring (*Clupea pallasi*) at the northern end of the region, and northern anchovy (*Engraulis mordax*) and squid (*Loligo opalescens*) at the southern end. The region is home to many marine mammals and seabirds.

Highlights

Cooler conditions, with stronger than normal coastal upwelling that developed in 1999 have persisted through 2002. They appear to be part of a large-scale pattern that covers the entire North Pacific, and are consistent with those experienced during a La Niña and/or the negative phase of the Pacific Decadal Oscillation.

Biological productivity has been higher over the past four years than in the 1990s, particularly off California. There have been large changes in the distributions and composition of zooplankton and fish species, consistent with more favourable conditions for cold-water species. This may represent a change in the carrying capacity of the system.

Seabird productivity appears to have improved in recent years in both the southern (California) and northern (British Columbia) sections of the region.

Zooplankton concentrations off Baja California were very low in 2001 and 2002, perhaps due to depression of the normal subtropical fauna by the cool waters.

Critical factors causing change

Climate

The region experienced a strong change in the late 1990's as it shifted from El Niño conditions in 1997-1998 to La Niña conditions in 1999 (Ocean/Climate Chapter). La Niña – like to near-normal conditions have persisted since 1999. The result has been a shift over much of this region from warm, low productivity to cool, higher productivity conditions. Some large-scale indices (e.g. Pacific Decadal Oscillation, PDO) changed from near-neutral to moderately strong negative values[xli]. A negative PDO characterizes cool near-surface temperatures in the California Current System.

Fisheries

The number of vessels with recorded commercial landings in California declined 20% between 1995 and 1999, to 2690 vessels[xlii].

Status and Trends

Hydrography

Near-surface temperatures changed from well-above normal during the 1997-1998 El Nino to well-below normal with the 1999 La Nino. In California, sea surface temperatures during the 1999 upwelling season were 3-4 °C below normal. Recent near-surface temperatures have been slightly below their mean. Recent near-surface salinities have been near or above their 1990-1996 mean values[xliii].

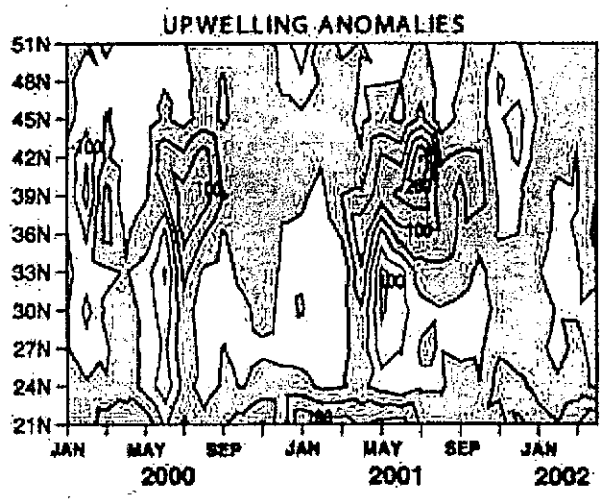

Figure 19 Monthly upwelling index anomaly for January 2000–April 2002. Shaded areas denote positive anomalies (greater than the 1948-67 monthly averages). Units are in m^3/s per 100 km of coastline.

Summertime upwelling-favourable winds, i.e. equatorward winds that drive coastal upwelling of cool nutrient rich water, varied from light during the 1997-1998 El Niño to strong during the 1999 La Niña. Upwelling was extremely strong during 2000 and 2001 from about San Diego to the Columbia River, and off southern Baja California. Other than the record 1999 upwelling, 2001 featured the highest mean summer upwelling index since 1981. Weaker than normal upwelling prevailed off northern Baja California in 2001. April 2002 indices indicate that the latest upwelling season is off to another strong start[xli].

Since 1999, the core of the southward-flowing California Current has been strong, and displaced offshore of its normal position, particularly in southern California[xliii]. At the northern end of the California Current System off British Columbia, mean currents have been near-normal and poleward in winter, and weaker poleward or more strongly equatorward than normal in summer. The timing of spring and fall reversals in current direction in the northern part of the system occurred as normal[xliv]. Sea surface temperatures at British Columbia coastal lighthouses under the influence of the California Current (Amphitrite, Kains Island, and Pine Island) have persistently lower spring temperatures since 1999[xlv]. Average spring temperatures in 1999 had not been as cool since before the 1976/77 regime shift.

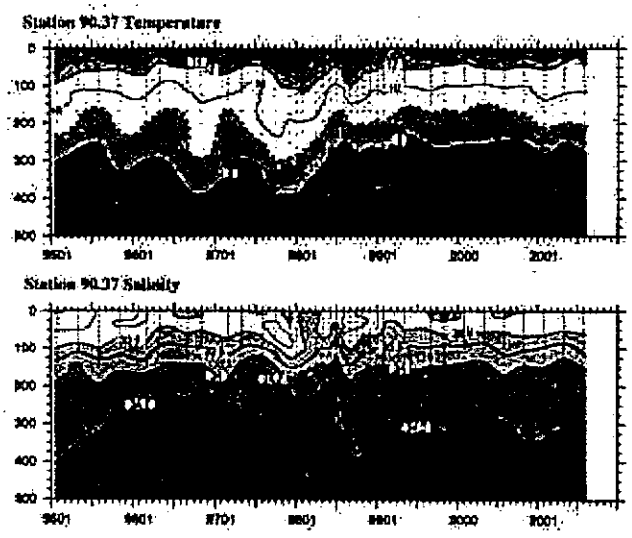

Figure 20 Time series of temperature and salinity over the upper 500 m at CalCOFI station 90.37 (between San Clemente and Catalina Islands), 1995–2001. Temperature contour interval is 2 °C for T>10 °C, 1 °C for T<10 °C. Salinity contour interval is 0.2. Dots denote positions of samples.

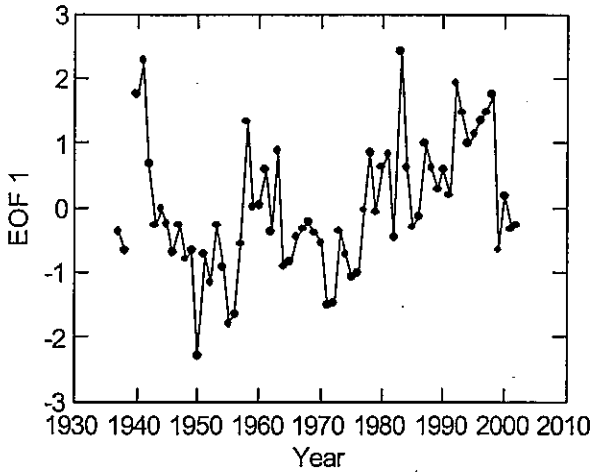

Figure 21 EOF 1 values indicate the shared history of spring (April/May) sea surface temperatures from 1935 to 2002 at 3 coastal lighthouses in the northern California Current region.

Chemistry

Nutrient concentrations, represented by nitrate, were low in the offshore, northern sector during the 1997-1998 El Niño. They have continued to increase since then, reaching pre-1990 levels. Higher nitrate concentrations on the continental shelf are also a result of stronger upwelling[xliv].

Plankton

Phytoplankton Chlorophyll *a* concentrations were high during the La Niña of 1999, and have been near normal in recent years after the below-normal concentrations during the 1997/987 El Niño. At the northern end of the region, SeaWIFS satellite data suggest the spring blooms may have begun a month earlier (in March) in recent years than normal[xliv].

The relatively high concentrations of chlorophyll observed on recent CalCOFI cruises may be part of a longer term tendency of higher production in the CCS. CalCOFI observations indicate that recent levels are substantially higher than historical values. The spring and summer means for the past four years represent a 14% increase from 1991-97, and a roughly 40% enhancement over the period prior to 1991. This may be related to summer coastal upwelling at 36°N during 1998-2001 being 27% stronger than during 1991-97.

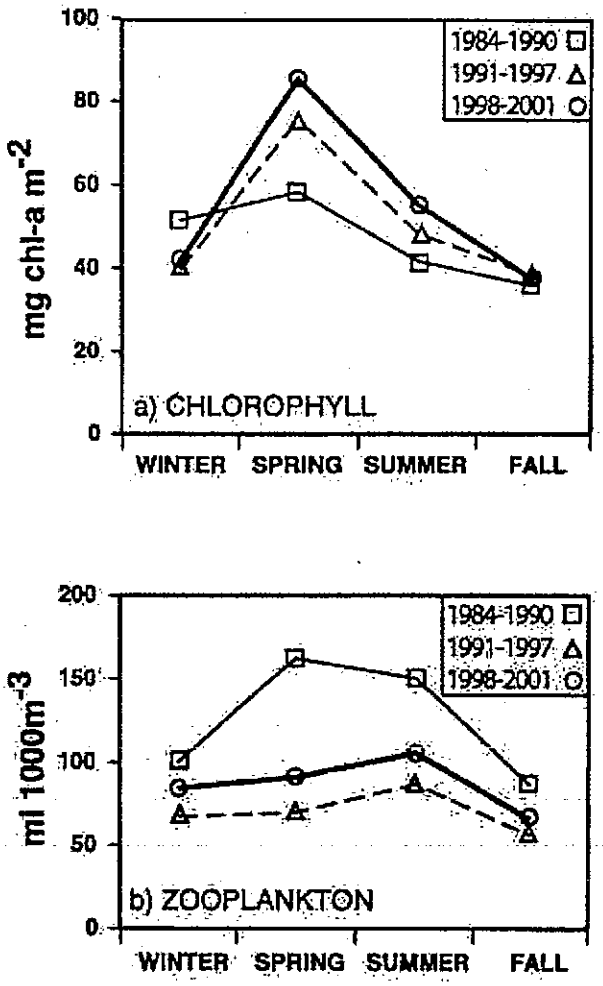

Figure 22 Seasonal averages of a) chlorophyll and b) macrozooplankton biomass from the CalCOFI cruise means, comparing seasonal means for 1984-90 (squares), 1991-97 (triangles), and 1998-2001 (circles).

Zooplankton The timing of peak zooplankton biomass differed between the southern California, northern Baja California, and central Baja California regions during the 1997-98 El Niño event. In this particular event, southern California waters were poor in zooplankton biomass, but biomass was high in Baja California waters. In contrast, zooplankton biomass remained low in Baja California during the 1998-99 La Niña, while the southern California region experienced a strong rebound[xli] with macrozooplankton biomass near its long-term (1951-1984) mean in southern sectors and a more normal gradient of cool water boreal species in the northern sections to warm water sub-tropical species in the southern sections[xli].

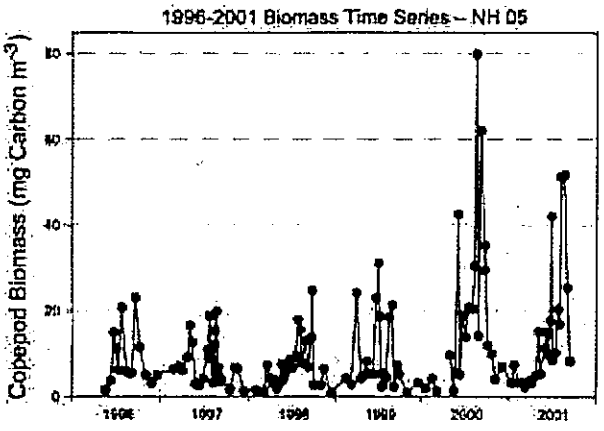

Figure 23 Time series of copepod biomass at station NH 05 (60 m water depth) off Newport, OR, 1996–2001. Biomass units are mg carbon m^{-3}.

Fish and Invertebrates

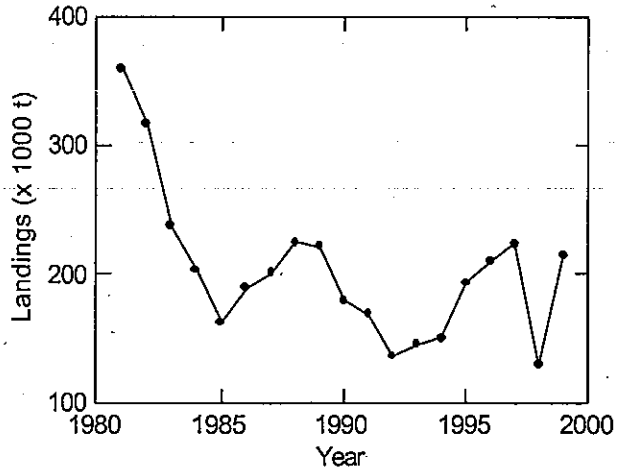

Figure 24 Annual total landings (x 1,000 t) of commercially caught species in California.

Total landings of commercial species in the California Current System have not shown strong trends recently. This is in part a result of compensation by one species group for the declines of another species group. The general trend has been for warm water species to have been favoured during the El Nino conditions of the mid-1990's at the expense of cool water species. Declines have occurred with groundfish, sea urchins (in California), sharks and swordfish (*Xiphias gladius*), salmon, and abalone, whereas expanding fisheries have occurred for squid, shrimp, and coastal pelagic species such as sardine, mackerels, and Pacific hake. Declining species appear to have been impacted by a combination of unfavourable environmental conditions and extensive fishing pressure[xliii].

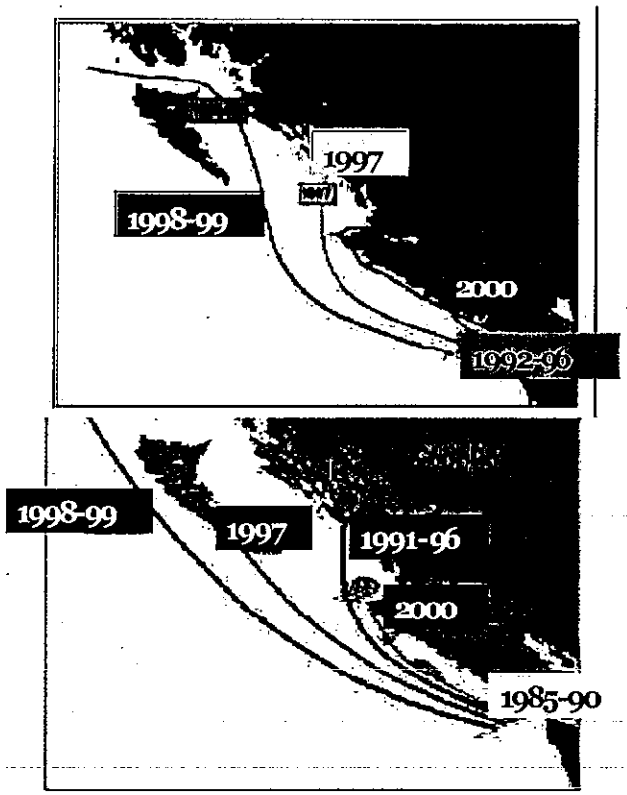

Figure 25 Distributions of Pacific sardine (above) and Pacific hake (below) in the latter part of the 20th century.

The shift to cool La Nina conditions is expected to alter the mix between warm and cool-tolerant species, although the full impact of this shift on these higher trophic levels will take several years to become apparent because of the different life spans among species. However, large shifts in the distributions of migratory coastal pelagic species such as sardine and Pacific hake have occurred with the colder conditions since 1999: the extensive northward distributions of these species that occurred during El Niño have retracted strongly southwards.

Surveys conducted in the vicinity of the Columbia River are finding that catches of forage fishes (whitebait smelt, Pacific herring, and northern anchovy) have been increasing from very low levels in 1999. Only sardine abundance has remained constant between 2000 and 2001[xlvi].

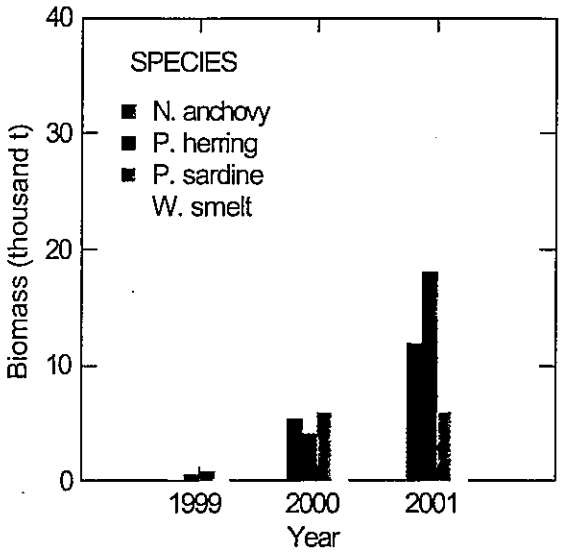

Figure 26 Annual densities of whitebait smelt, Pacific herring, northern anchovy, and Pacific sardine off the mouth of the Columbia River from April to July[xlvii].

Seabirds

Productivity data from 2001 from California shows enhanced seabird productivity after the 1998 regime shift. The period 1999–2001 yielded significant increases in the productivity of Cassin's auklet (*Ptychoramphus aleuticus*), pelagic cormorant (*Phalacrocorax pelagicus*), and pigeon guillemot (*Cepphus columba*), and marginally significant increases in the productivity of Brandt's cormorant (*Phalacrocorax penicillatus*), and rhinoceros auklet (*Cerorhinca monocerata*). Only one species, the common murre (*Uria aalge*), did not display a significant increase in productivity after 1998[xlii].

At the northern end of the California Current system, in British Columbia, the timing of breeding for rhinoceros auklet, tufted puffin (*Fratercula cirrhata*) and Common Murre was similar to 1999 and 2000. In contrast, the timing of breeding for the planktivorous Cassin's auklet was advanced over the previous two years, so that the earliest hatch date in the Triangle Island series was recorded in 2001[xliv].

Marine mammals

Sea otter (*Enhydra lutris*) populations in the California Current system are expanding. In California, this population growth ceased during the 1997-1998 El Niño, possibly due to a reduction in food. The interaction of sea otters with commercially fished species, in particular invertebrates, is an important issue.

Due to the rapid expansion of some California Current fisheries, in particular in California, there has been an increase in the number of incidental captures of marine mammals in fishing operations[xliii]. A major issue is therefore how to reduce this incidental capture of marine mammals. California sea lion (*Zalophus californianus*) and harbor seal (*Phoca vitulina*) populations appear to be growing, although fishing mortality has increased on sea lions. The Stellar sea lion (*Eumetopias jubatus*) population along the west coast of North America (excluding Alaska) is estimated to be about 39,000 individuals, which is less than 50% of the 1956-1960 population estimate. This species is now listed as endangered. Many whale populations are growing, including humpback whale (*Megaptera novaeangliae*) and gray whale (*Eschrichtius robustus*), and the latter was been removed from the endangered species list in 1994. PCB concentrations in free ranging killer whales measured in British Columbia are among the highest measured for cetaceans in the world, putting them at risk for toxic effects. Transient killer whales (*Orcinus orca*) which migrate widely along the west coast of North America were the most heavily contaminated[xlviii].

Issues

Key questions and data requirements

Major issues include lack of understanding of the interactions among environmental variability, recruitment fluctuations, and fishing pressure; over-harvest of low mobility species such as abalone and rockfishes; interactions between fisheries and marine mammal populations; and pollution/contaminants problems.

How the 1999 regime shift will affect the California Current System is unclear. There is a need for expanded and coordinated monitoring of the system.

When will the next El Niño occur? Weak signals of building El Nino's periodically arise from conditions in the tropical Pacific.

Contributors

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Sample report for discussion only

Inter-American Tropical Tuna Commission

The Inter-American Tropical Tuna Commission (IATTC) defines the eastern Pacific Ocean (EPO) as the area bounded by the coastline of North, Central, and South America, 40°N, 150°W, and 40°S. IATTC staff maintain records for most of the vessels which fish at the surface for yellowfin tuna (*Thunnus albacares*), skipjack tuna (*Katsuwonus pelamis*), bigeye tuna (*T. obesus*), or Pacific bluefin tuna (*T. orientalis*) in the EPO. Of these, bluefin tuna and albacore tuna are the most relevant to the region of interest to PICES. Records are not maintained for sport-fishing vessels and small craft, such as canoes and launches.

Pacific bluefin tuna

Most of the catches of Pacific bluefin tuna in the EPO are taken by purse seiners. Nearly all of this catch is made west of Baja California and California, within about 100 nautical miles of the coast, between about 23°N and 33°N. Lesser amounts of Pacific bluefin tuna are caught by recreational, gillnet, and longline gear. They are caught during every month of the year, but most of the fish are taken from May to October. The distributions of purse-seine catches of Pacific bluefin tuna in the EPO during 1970-1989 appear below.

In the EPO, Pacific bluefin tuna are most often found in waters where the sea surface temperatures are between 17° and 23°C[xlix]. Fish 15 to 31 cm in length are found in the western Pacific Ocean (WPO) in waters where the SSTs are between 24° and 29°C. Conditions in the WPO probably influence the portions of the juvenile fish there that move to the EPO, and also the timing of these movements. Likewise, conditions in the EPO probably influence the timing of the return of the juvenile fish to the WPO.

Pacific bluefin are exploited by various gears in the WPO from Taiwan to Hokkaido[xlix]. Age-0 fish about 15 to 30 cm in length are caught by trolling during July-October south of Shikoku Island and south of Shizuoka Prefecture. During November-April age-0 fish about 35 to 60 cm in length are taken by trolling south and west of Kyushu Island. Age-1 and older fish are caught by purse seining, mostly during May-September between about 30°-42°N and 140°-152°E. Bluefin of various sizes are also caught by traps, gillnets, and other gear, especially in the Sea of Japan. Bluefin are also caught near the southeastern coast of Japan by longlining.

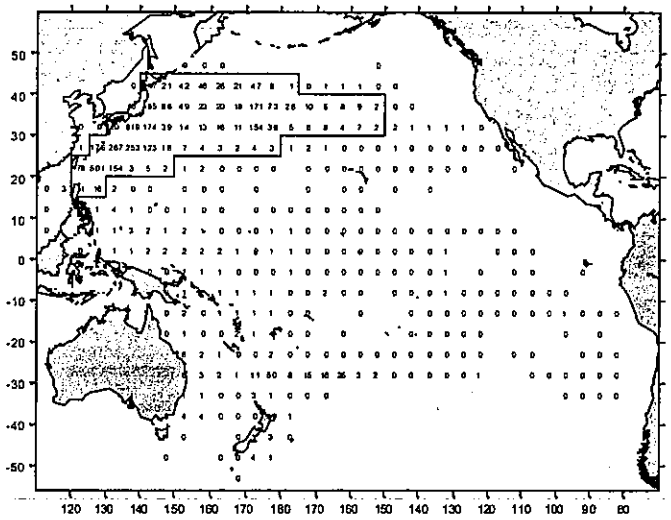

Figure 27 5° latitude by 5° longitude quadrangles in which Pacific bluefin tuna were captured by the Japanese longline fleet during January 1952 – December 1997[li]. The numbers indicate the total number of Pacific bluefin tuna (100s) removed from each quadrangle during this period (zeros indicate catches of less than 51 fish). The quadrangles inside the polygon extending from Japan to 150°W constitute the core area[l]

The high-seas longline fisheries are directed mainly at tropical tunas, albacore, and billfishes, but some Pacific bluefin are also caught. Catch distributions of bluefin by Japanese longliners during 1952-1997 in the Pacific Ocean are shown above[li]. Small amounts of Pacific bluefin are also caught by Japanese pole-and-line vessels on the high seas.

Various indices of abundance of Pacific bluefin in the EPO have been calculated, but none is entirely satisfactory. Pacific bluefin are most often found in waters where the SSTs are between 17° and 23°C[lii], so the 1° areas north of 23°N and west of California and Baja California in which the SSTs were in that range during May through October were defined to be "bluefin habitat."[liii] The catches of Pacific bluefin in those 1° areas during each year were divided by the corresponding numbers of unstandardized days of fishing effort to obtain CPUE (Fig. 18). Indices of abundance of bluefin for the WPO were prepared by IATTC and by scientists from other nations. Watters' time series of abundance indices for the "core area" (Figure 27) in the WPO for the Japanese longline fishery are shown in Figure 19.

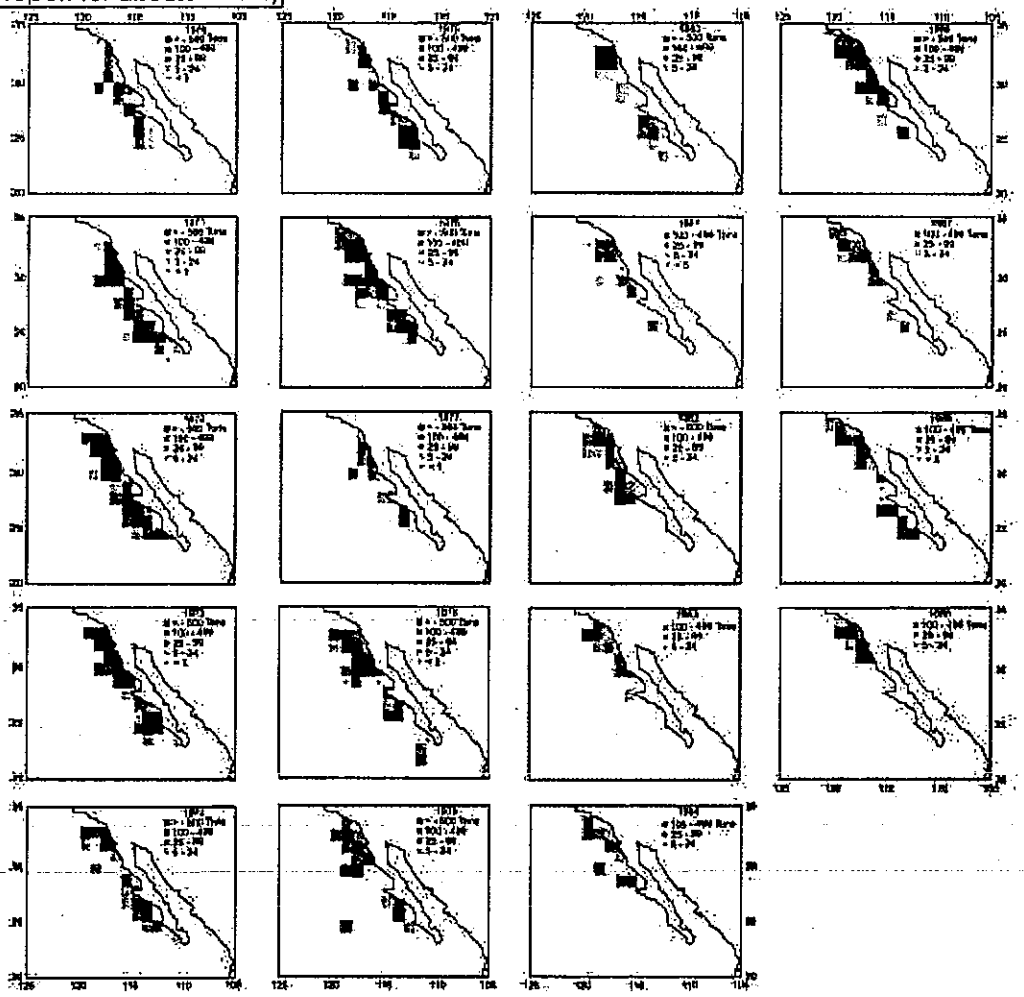

Figure 28 Annual distributions of Pacific bluefin tuna catches in the eastern Pacific Ocean, 1970-1989[liv].

The National Research Institute of Far Seas Fisheries, Japan, has been tagging Pacific bluefin tuna with archival tags to study the relationships between their movements and the physical environment[lv,lvi]. The first recapture of a Pacific bluefin tuna that made a trans-Pacific migration while carrying an archival tag was reported[lvii].

There was general agreement at a working group meeting on bluefin tuna in December 2000, to start the process of developing a Pacific-wide assessment of bluefin tuna using the same length-based age-structured model approach used for yellowfin and bigeye tunas in the EPO[lvi].

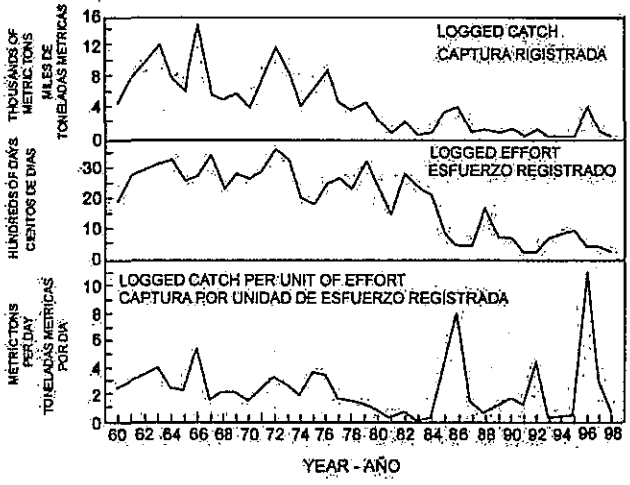

Figure 29 Catch, effort, and catch-per-unit of effort data for the surface fishery for bluefin tuna in the EPO, as determined by the habitat index method. The data for 1998 are preliminary[xlix].

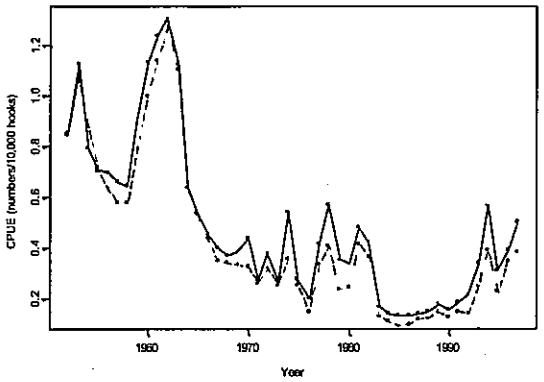

Figure 30 Time series of regional abundance indices for the core area. The trend with a dashed line and open circles is the time series estimated from the safe abundance indices. The trend with a solid line and filled circles is the time series estimated from pooling the safe and the extrapolated abundance indices[lvii].

Albacore tuna

There are two stocks of albacore in the Pacific Ocean, one occurring in the northern hemisphere and the other in the southern hemisphere. In the North Pacific, the adults live mostly in the Kuroshio Current, the North Pacific Transition Zone, and the California Current, but spawning occurs in tropical and subtropical waters[lviii].

Albacore are caught by longliners in most of the North Pacific, but not often between about 10°N and 5°S, by trollers in the eastern and central North Pacific, and by baitboats in the western North Pacific[lviii]. Albacore are caught by fisheries from several nations, including Canada, Japan, Republic of Korea, Mexico, People's Republic of China, Taiwan, U.S.A, and others. During the 1980s and 1990s, the catches have ranged between about 45,000 and 75,000 metric tons in the North Pacific.

There appear to be two subgroups of albacore in the North Pacific Ocean. The fish of the northern subgroup occur mostly north of 40°N when they are in the eastern Pacific Ocean. There is considerable exchange of fish of this subgroup between the troll fishery of the eastern Pacific Ocean and the baitboat and longline fisheries of the western Pacific Ocean. The fish of the southern subgroup occur mostly south of 40°N in the eastern Pacific, and relatively few of them are caught in the western Pacific. Fish that were tagged in offshore waters of the eastern Pacific and recaptured in the coastal fishery of the eastern Pacific exhibited different movements, depending on the latitude of release. Most of the recaptures of those released north of 35°N were made north of 40°N, and most of the recaptures of those released south of 35°N were made south of 40°N.

The distribution of catches per day's fishing for albacore tuna caught by U.S. troll vessels in 1999 in the North Pacific[lix] appears in Fig. 32 and the distributions of catches per hook of albacore tuna by Japanese longliners[lviii] averaged over 1952-1976 appears in Figure 31. Time series of recruitment, biomass, and average weights have not been prepared by the IATTC for albacore in the North Pacific Ocean.

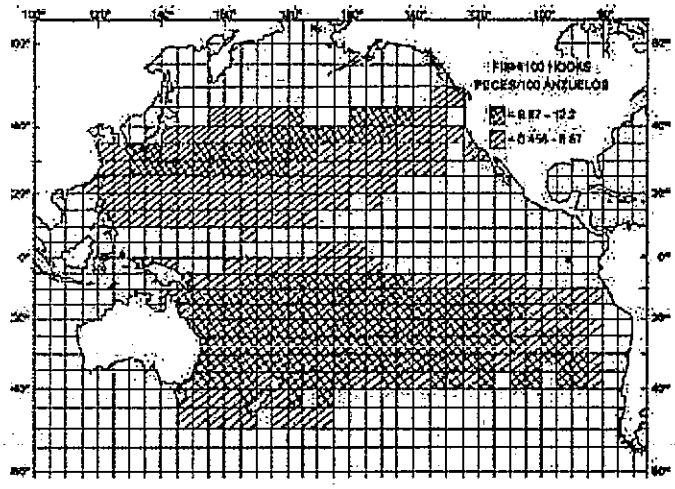

Figure 31 Distribution of catches per hook of albacore by Japanese longliners averaged over the 1952-1976 period[lviii].

Ecosystem model and climate forcing

The staff of the IATTC has been developing a modeling approach to evaluate the ecological implications of alternative fishing strategies in the pelagic tropical (EPO). Additional development and evaluation of the EPO ecosystem model was accomplished by a working group funded by the National Center for Ecological Analysis and Synthesis (NCEAS) in Santa Barbara, California. One of the products of the working group was an evaluation of the implications of climate forcing on ecosystem dynamics of the tropical EPO.

The staff of the IATTC has been developing a modeling approach to evaluate the ecological implications of alternative fishing strategies in the pelagic tropical (EPO). Additional development and evaluation of the EPO ecosystem model was accomplished by a working group funded by the National Center for Ecological Analysis and Synthesis (NCEAS) in Santa Barbara, California. One of the products of the working group was an evaluation of the implications of climate forcing on ecosystem dynamics of the tropical EPO. One of the

ways that the physical environment affects ecosystem dynamics is by inducing variation in primary production at the base of the food web. The tropical EPO is strongly influenced by El Niño and La Niña events. Over a large portion of the tropical EPO, the chlorophyll concentrations are reduced during El Niño and increased during La Niña. To simulate ENSO-scale variations in producer biomass in the ecosystem model, the working group constructed an empirical model that relates SST anomalies to surface chlorophyll concentrations. They used time series of SST anomalies to specify trajectories of producer biomass, and simulated the ecosystem effects of ENSO-scale pulses and cycles and a time series of producer biomass predicted from a greenhouse-warming scenario for the 21st century. A manuscript describing the analysis has been submitted to *Fisheries Oceanography*, and is in review at the present time.

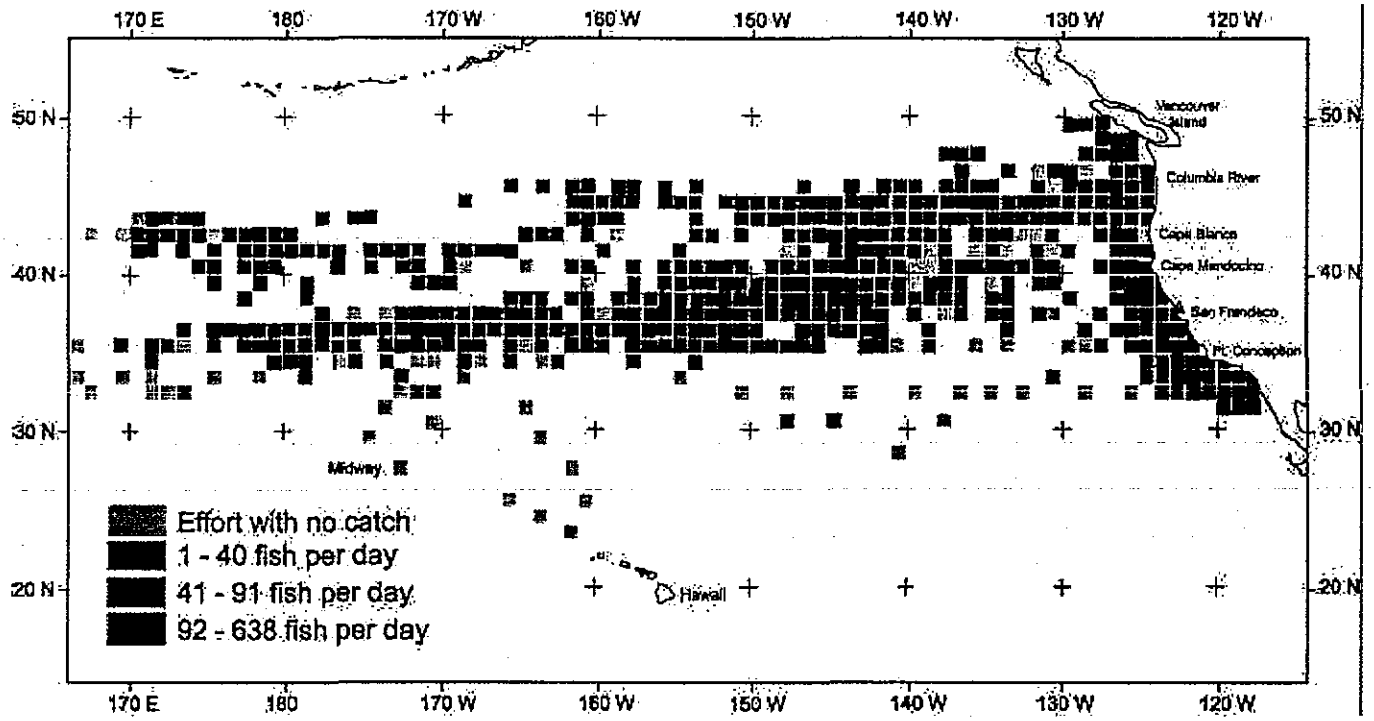

Fig. 32 Distribution of albacore CPUEs by U.S. troll vessels in the North Pacific Ocean during 1999[lix].

Contributors

Robert Olsen, Inter-American Tropical Tuna Commission

Sample report for discussion only

International Pacific Halibut Commission

Distribution

Pacific Halibut (*Hippoglossus stenolepis*) are found throughout the coastal waters of Alaska, British Columbia, Washington, Oregon and into northern California. The center of abundance is the central Gulf of Alaska, particularly near Kodiak Island. The depth range for adult halibut ranges from 50 m in the summer to 600 m during winter spawning. Pacific halibut are generally found in temperatures from 3-9° C.

Biology

Pacific halibut mature at approximately 8 years of age. During the spawning season - generally November to March - adult fish move to deeper waters near the edge of the continental shelf. Halibut are broadcast spawners with fertilization occurring by random external contact. Halibut eggs and larvae drift in the surface currents for 6-7 months after spawning. During this long pelagic phase, halibut are moved generally west in the Gulf of Alaska and north into the Bering Sea by the dominant surface currents before settling to the bottom in shallow waters in late spring and summer. The relative distribution of recruited halibut (i.e. fish age eight and older) biomass by area remains relatively constant from year to year. To achieve this continuity, juvenile halibut migrate back to the south and east towards their spawning grounds. This counter migration usually takes place between ages 2 and 6. Adult halibut show seasonal migration (to deeper water for spawning) but very little directed migration.

Pacific halibut is the largest flatfish in the world, reaching a length of 2.7 meters and weight of 300 kg. It has a flat, diamond shaped body; the colored side is a mottled brown and over 99% are dextral, i.e., the eyes are on the right side of the fish. The oldest identified halibut was a 55 year old male however fish over 25 years of age are uncommon. Females grow much larger than males.

The Fishery

A commercial fishery for halibut has existed since 1888. During the 20th century, landings ranged between 17,000 and 40,000 metric tons. The current health of the fishery is attested to by the fact that some of highest landings on record were taken in the last 5 years of the 1990s. Since 1995, the fishery has been managed under an Individual Transferable Quota system. Currently, the ex-vessel value of the fishery is around $US 175 million. In addition to the commercial fishery there is a growing sport fishery and halibut are also captured incidentally in other North Pacific groundfish fisheries.

Climate Influences

During the 20th century, there have been dramatic and persistent changes in the growth and recruitment of Pacific halibut that cannot be readily explained by changes in stock size. Over the last 15 years, the growth of halibut has decreased substantially, especially in Alaska.

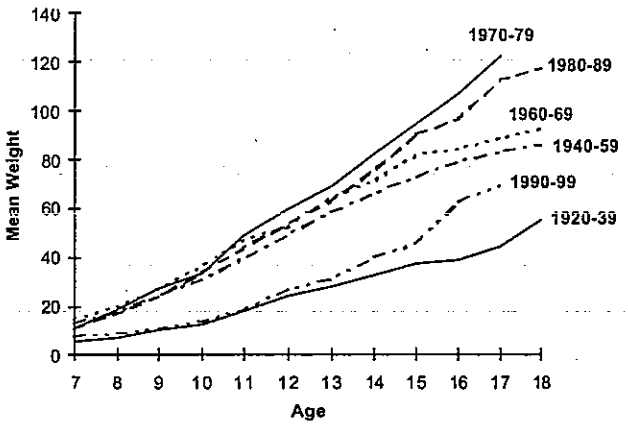

Figure 33 Changes in mean weight at age for female Pacific halibut in Alaska, 1925-2000

An eleven-year-old female halibut landed in Kodiak, Alaska averaged 40 pounds in weight in 1980. In 1995, the average weight for the same age female halibut was less than 20 lbs. Fifteen years ago fish of a given age were substantially larger in Alaska than in British Columbia; now there is no difference. In both respects, halibut growth is similar to what was observed in the 1920s and 1930s. An increase occurred sometime during the 1940s, and the present decrease began in the mid-1970s. Fish are also maturing at a smaller size now than they used to, while the age at maturity is quite close to what it has always been.

There have also been clear decadal variations in halibut recruitment all through the century, or at least since about 1935. Most recently there was a run of good year-classes spawned in the late 1970's through late 1980's, apparently followed by a run of poor year-classes.

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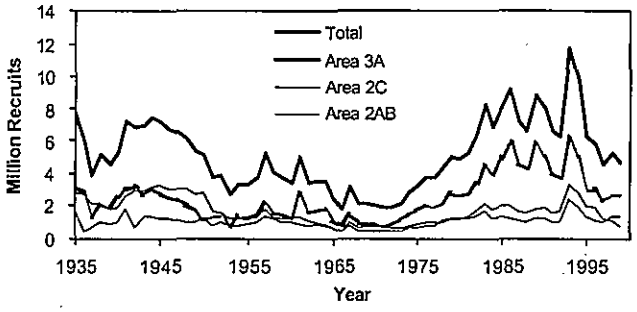


Figure 34 Long-term trends in recruitment (measured as six-year olds) for IPHC areas 2AB (British Columbia), 2C (Southeast Alaska), and 3A (central Gulf of Alaska)

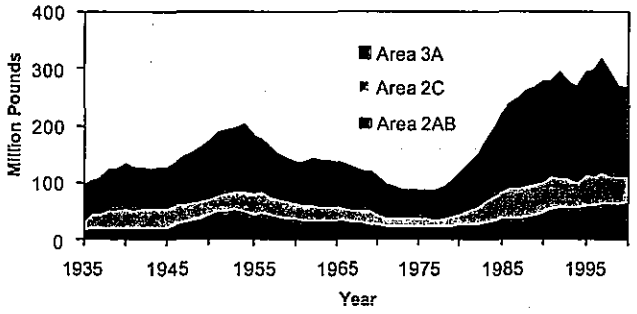


Figure 35 Long-term trends in spawning biomass for IPHC areas 2AB (British Columbia), 2C (Southeast Alaska), and 3A (central Gulf of Alaska)

This kind of alternation has sometimes been viewed as a cycle, but could just as well reflect distinct periods of different environmental conditions. Recent work has strongly suggested that halibut recruitment is driven primarily by the Pacific Decadal Oscillation (see Ocean/Climate chapter). Stock size explains very little of the variability in recruitment; use of the PDO as a covariate explains much of the observed variation however. The PDO has alternated between positive (productive for halibut) and negative (unproductive) phases every 25-35 years.

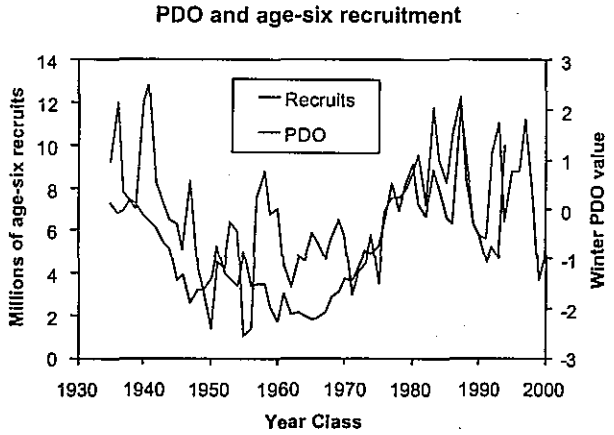


Figure 36 Timeseries of winter values of the Pacific Decadal Oscillation (PDO) and halibut recruitment.

Available time series

Age-6 Recruitment, 1935-1994, GOA and BC
: These estimates are generated from a catch-age stock assessment model

Spawning biomass, 1935-2001. GOA and BC
: These estimates are generated from a catch-age stock assessment model

Weight at age, incomplete from 1925-2000, GOA and BC
: These estimates come from fish measured during annual surveys.

Contributors

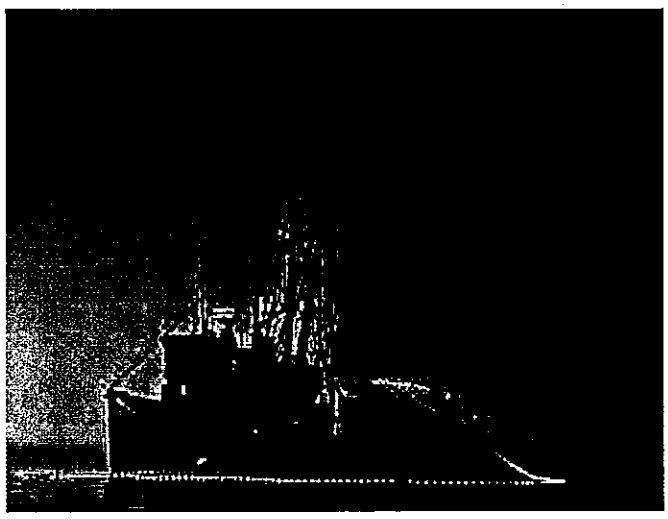
Steven R. Hare (International Pacific Halibut Commission, Seattle, USA)

Sample report for discussion only

North Pacific Anadromous Fish Commission

(Under construction)

The North Pacific Anadromous Fish Commission agreed to report on the status of, trends in, and issues associated with Pacific salmon in the North Pacific Ocean.



Sample report for discussion only

Sample report for discussion only

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Alaska Research and Development (ARAD) Data System

Kara L. Nance and Brian Hay
Geographic Information Network of Alaska (GINA)
University of Alaska Fairbanks

The Alaska Research and Development (ARAD) Data System provides a web interface to the many research programs and projects in Alaska. There are four major categories of data including the following:

- Instruments and Equipment (Equipment) (See status report)
- Facilities and Field Sites (Facilities)
- Projects and Programs (Projects)
- Capabilities and Expertise (Experts)

These four categories are closely interrelated and cyclic, whereas most web data systems are hierarchical. Implementation of cyclic web data system is a complex task for the web system designer. The programmer must implement the complicated internal requirements necessary for a cyclic system to run. In addition, the system must be simple enough for the target population to use effectively to accomplish their goals. The prototype ARAD data system accomplishes both goals through the use of three distinct layers in the implementation. Figure 1 shows the ARAD Home Page. Note that Instruments and Equipment will be replace by Publications, based on preliminary audience analysis.

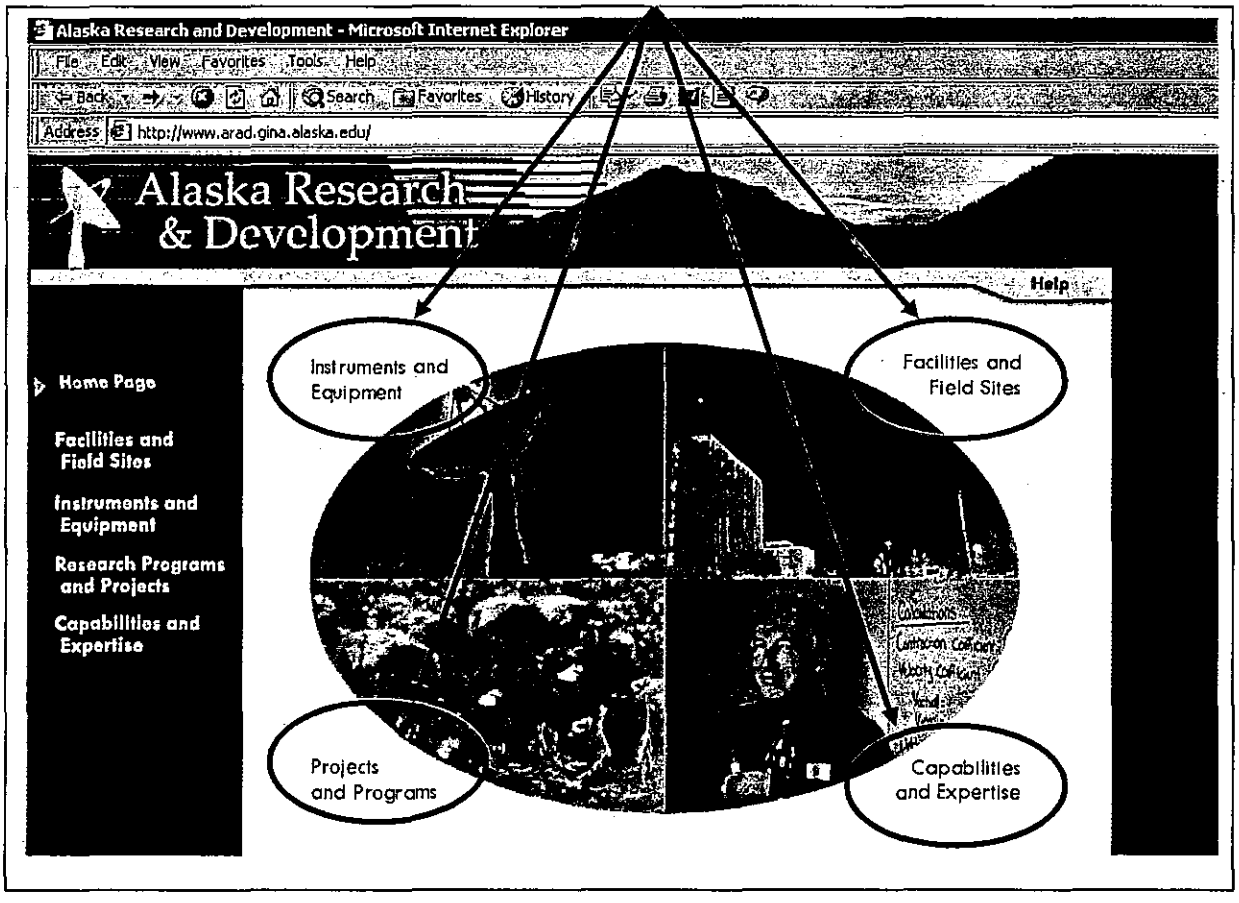

Figure 1 – ARAD Home Page

Selecting Equipment, Projects, or Capabilities brings the user to a view similar to that shown below. Figure 2 shows the resulting screen when a user chooses Project as the selection. If one of the other areas has been selected, the results would be similar, but data from the other area would replace the Project data.

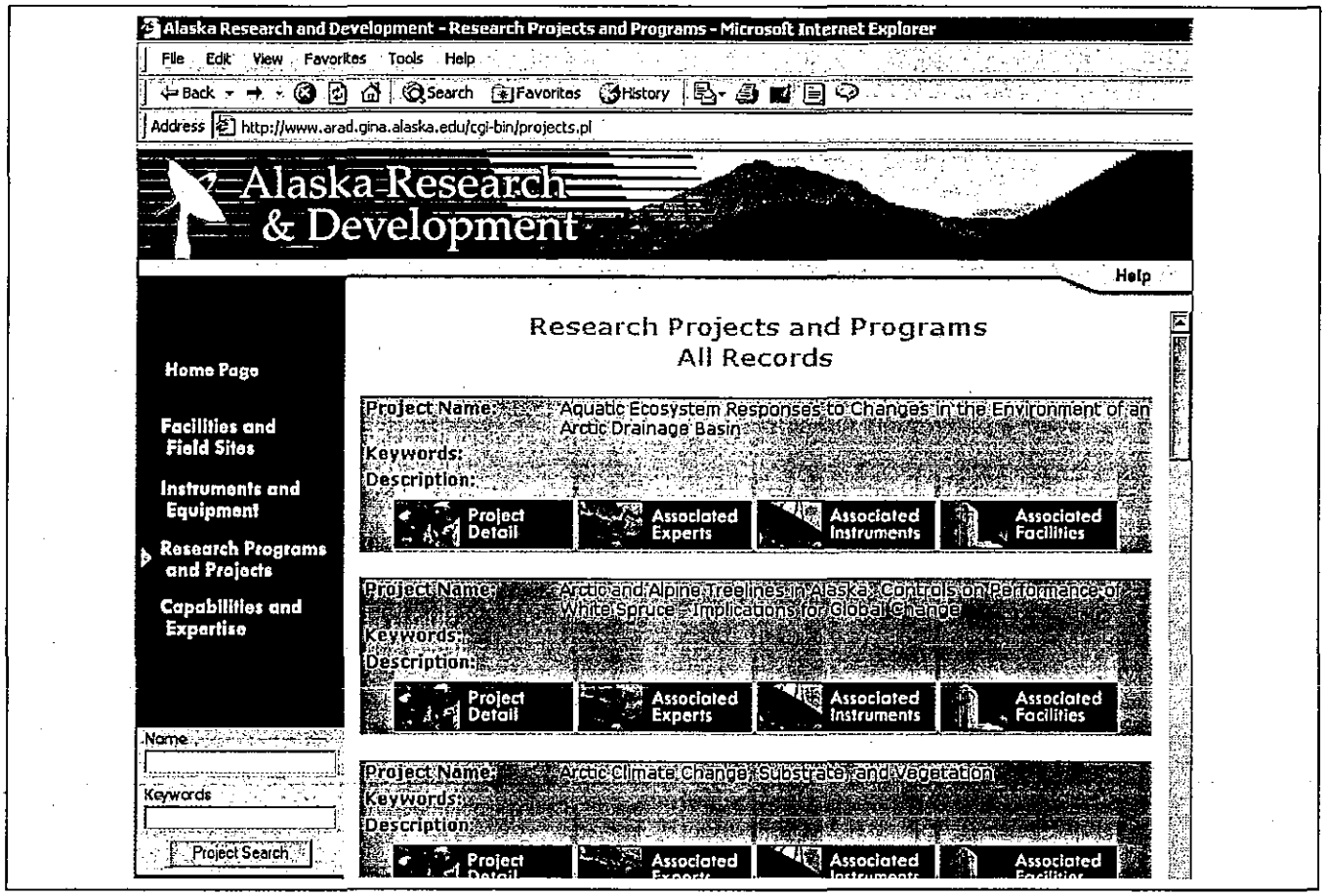

Figure 2 – Project Screen

The data items for the current scope are presented for the user's perusal. Note the navigational icons associated with each Project description that would allow the user to view the experts, instruments, or facilities associated with the selected project. In addition, the user has the capability to seek more detail on the Project.

Facilities is a more complex data system within ARAD as it allows the user to use graphical navigation. Selecting Facilities will give the user the view shown in figure 3. (Note that the map diagram is a temporary "proof-of-concept" solution. We are negotiating with National Geographic to obtain permission to use their seamless topo maps to provide multiple views as a starting point for user searches.) Each of the regions on the map is "selectable" and will take the user to a more detailed map. Note that the association options below the map image remain and are used as described in the previous section. If available, at the appropriate level, the map image will change to a photo image.

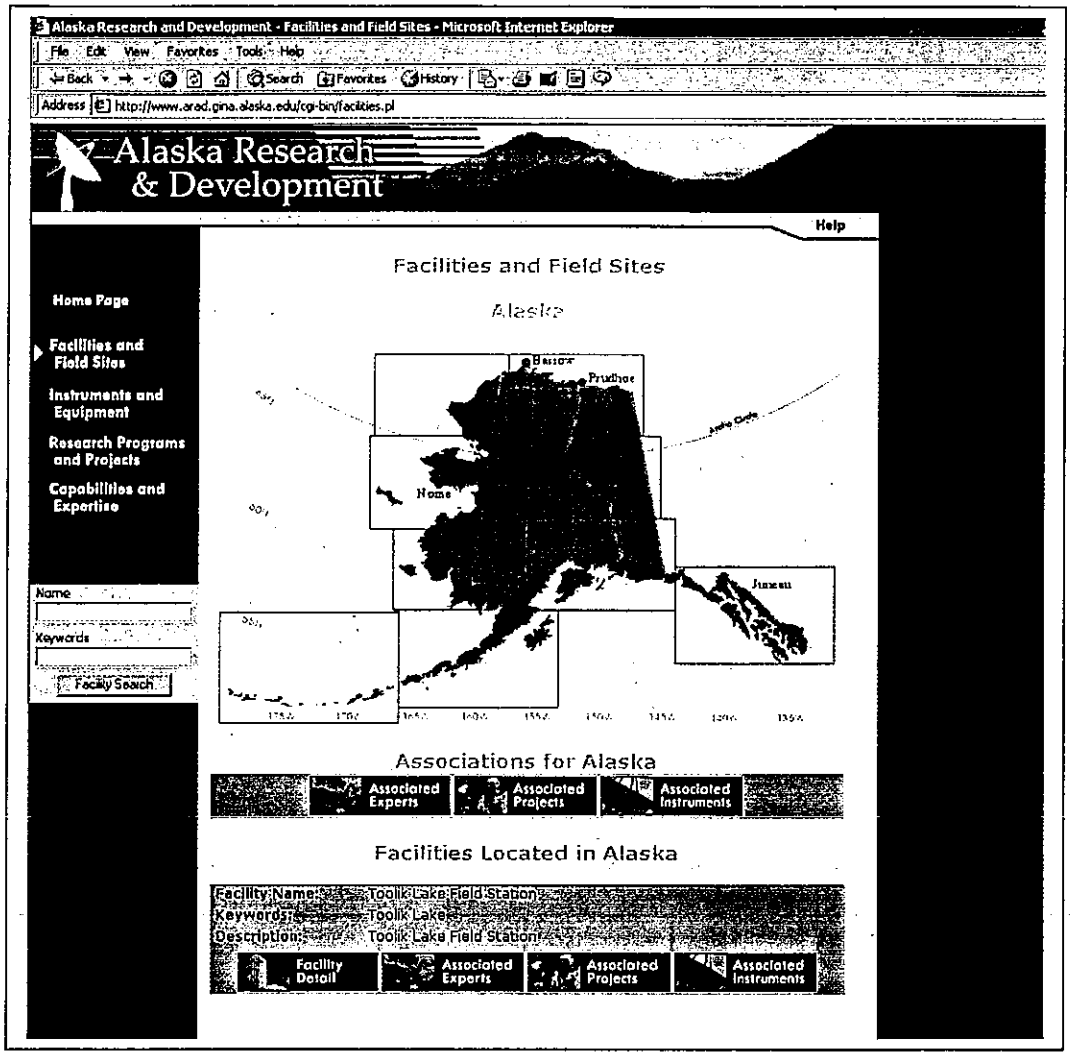

Figure 3 – Facilities and Field Site

Thus the ARAD Interface provides the user with cyclic navigation capabilities while "remembering" the interests of the user as they proceed through the system. Similarites in screen presentation provide consistency for the user so that the complexity of the learning curve is minimized. Additional functionality is provided for the advanced user such as search capabilities.

Future Considerations:

The prototype system has been demonstrated at three conferences. As a result, the system is being refined to meet the needs of the target populations. Thanks to funding provided by the Exxon Valdez Oil Spill Trustee Council, the equipment necessary to make ARAD an autonomous entity has been ordered and is expected to arrive in the next few weeks. Interest in obtaining publication information by far exceeds the requests for information regarding instrumentation, thus the Instrumentation Module is being replaced by a Publication Module. Instrumentation information will still be available through the Facilities Module. Datasets appropriate to the ARAD system are being identified and the process of collecting and reformating the data is being automated for cases where the automation is cost-effective. Future modules include User Help, Advanced Search, Acknowledgments, and traditional Supporting Documents links.

The Geographic Information Network of Alaska (GINA): A Integrated System-wide Approach to GIS Data Services.

Dr. Buck Sharpton, President's Professor of Remote Sensing and GINA Director
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Background and Goals. The University of Alaska has identified a strong need for coordinated and sustained support of remote sensing and geospatial data activities that enhance its service role to the state. The Geographic Information Network of Alaska is the keystone program developed in 2001 to fill that need. GINA is a system-wide resource offering a coordinated approach to data management, distribution, analysis, and application development, as well as training. GINA consists of a open-ended network of quasi-independent 'nodes' or individual programs, with local and regional identities and relevance, linked through a set of system-wide activities located at the University of Alaska Fairbanks.

GINA's goals are fivefold:

1. To more efficiently integrate geospatial information and satellite image data into the university's mission of providing high-quality education and basic research opportunities.
2. To expand the use of satellite remote sensing and geospatial information systems (GIS) applications within government agencies and the private sector.
3. To create a new capability for serving Alaska's needs to monitor natural resources, natural hazards, and the effects of climate change in fragile northern environs.
4. To foster the development of new high technology jobs in Alaska by encouraging industrial applications of remote sensing and GIS.
5. To provide certification, and career retraining in these emerging technologies.

Node Characteristics. Activities that generate data, information, or knowledge are considered 'nodes'. Each node can maintain its own local data system or utilize the resources of GINA Central described below. GINA is designed so that each node retains its individual local and regional identity and evolves in accordance with the interests, capabilities, and commitments of its participants (and how well it serves it client base). Information on current and planned nodes is provided in the Table 1.

GINA Central: Statewide Data Center Activities. All nodes can utilize certain shared 'system-wide' resources to minimize outlays required to sustain their activities. These resources are the 'connective tissue' that hold the network together and provide the linkage across which information flows from one node to another, or from one or more nodes and the outside world. GINA Central is designed to expand node and network capabilities, provide a simple, uniform link with the outside world, minimize duplication of resources and to coordinate nodal activities. Activities include: (1) providing capabilities to ingest, house, and distribute data, (2) designing and maintaining a common, university-wide data system (including web design and links to other data systems and clearinghouses); and (3) coordinating node activities (*i.e.*, provide a point of initial contact, develop opportunities, inventory resources and capabilities, provide other resources to minimize unnecessary duplication of university-funded infrastructure).

Table 1: GINA Node Characteristics			
Name	*Location*	*Focus*	*Contacts*
International Observatory of the North (ION)	UAF	Real-time satellite data reception, processing, application development, distribution and training	Buck Sharpton Kevin Engle
Alaska Research and Development Project (ARAD)	UA	Projects, facilities, researchers, and publications related to research and development in Alaska	Craig Dorman Kara Nance
SynCon	UAF	Arctic Contaminants	Kara Nance Shari George
The National and Social Systems Node	UAA	Natural conservation, landuse planning; tracking tourism	Keith Boggs Steve Colt
Geomatics Training Program	UAA	Workforce development and professional retraining in GIS	Cheri Northon
Geospatial Data at UAS	UAS	Education, training, and economic development	Carl Byers

Infrastructural support provided by GINA Central includes a core of technical staff and facilities located on the Fairbanks campus, plus a suite of 'Data Content Specialists', faculty appointments, distributed across the University and supported by Data Initiative funds, to provide expert guidance as to the reliability of various data sets and to their appropriate use.

This presentation will focus on insights concerning the development, operation, and potential of data systems obtained during the first year of GINA's operation.

September 30, 2002 Draft

Memorandum of Agreement
Exxon Valdez Oil Spill Trustee Council,
North Pacific Research Board,
Northern Fund of the Pacific Salmon Commission,
and
University of Alaska

Section I. Parties

This Memorandum of Agreement ("MOA") is entered into by the *Exxon Valdez* Oil Spill Trustee Council, the North Pacific Research Board, the Northern Fund of the Pacific Salmon Commission, and the University of Alaska (the "Parties").

Section II. Purpose

Alaska's oceans and watersheds and their resources comprise one of the most productive ecosystems in existence and one of the Nation's greatest natural resources. There must be a concerted effort and commitment to maintain, monitor, and protect the long-term health and sustainability of this ecosystem, its habitats and resources. This can be accomplished, in part, through collaborative, coordinated efforts by the Parties to this MOA, which share responsibility for scientific research and monitoring of the fish and wildlife resources of the North Pacific Ocean and its watersheds. This MOA will provide a framework for the Parties to work cooperatively to more effectively accomplish their individual and common missions and provide for the long-term health and sustainability of Alaska's oceans and watersheds.

Section III. Findings

The Parties find the following:

1. The North Pacific is extensive and contains fish and wildlife resources of great economic, social, cultural, and scientific value;
2. Populations of many commercial and non-commercial species in Alaska's oceans and watersheds are changing for reasons not well understood;
3. Alaska's oceans and watersheds can best be managed and understood through an ecosystems-based approach, which is directed toward understanding how habitats and communities of species function together in response to environmental and anthropogenic factors;
4. Improved scientific understanding of the North Pacific will improve management of the region, thereby increasing the sustainability and efficiency of human use;
5. While each Party has its own mission and operates independently, together they share common interests in Alaska's oceans and watersheds;
6. Scientific understanding of the North Pacific can best be achieved through cooperation and collaboration of the various entities involved in marine research; and

7. Comprehensive, cooperative planning for marine research in the North Pacific is necessary to coordinate the efforts of Parties in order to maximize the benefits to the people who use and depend on Alaska's marine resources.

Section IV. Cooperative and coordinated research planning

The Parties shall cooperate and coordinate in developing research and monitoring plans for their respective geographic regions. They shall strive to (1) establish shared research priorities and work jointly towards attaining the priorities, (2) coordinate, to the extent permitted by governing legal mandates, the timelines and processes for proposal solicitation, review, and decision-making, and (3) cooperate in developing a network of people to assist with proposal and program reviews upon request.

Section V. Information and data

To enhance communications and availability of information, the Parties shall:

1. Share information regarding: (a) public meetings and newsletters, (b) timelines and processes for proposal solicitation, review, and decision-making, (c) ongoing and proposed research and monitoring activities, (d) invitations for proposals, and (e) results and data from all scientific research;
2. Cooperate in formulating procedures and mechanisms through which such information can be effectively shared; and
3. Develop specific data standards and quality control procedures so data are of the highest quality and compatible between participating agencies.

Section VI. Shared resources

To reduce costs, increase efficiency, and avoid duplication of effort, the Parties shall expedite access to each other's facilities and equipment and to pooled inventories of costly technology development projects and scarce human skill sets through the following actions:

1. Create a system for shared use of facilities to achieve mutual research and monitoring goals;
2. Develop a list of technologies for which the Parties will share development costs;
3. Develop a list of facilities and equipment for research and monitoring purposes potentially available for sharing;
4. Develop a directory of agency employees with scarce human skill sets who may be available to advise the Parties; and
5. Establish a timeline and process for effectively sharing these resources while protecting the interests of owners and employers.

Section VII. Joint meetings

The Parties will meet jointly at least annually. These meetings will help to foster cooperation among the parties, share findings with other participatory agencies, evaluate

research plans and progress in implementation, and coordinate in establishing priorities for research. Responsibility for planning, coordinating, supporting, and reporting on the meetings will rotate annually among the Parties.

Section VIII. Participation of other entities and facilities

The Parties recognize that adding new participatory agencies involved in North Pacific marine issues to this MOA will better enable participatory agencies to reach shared goals. The Parties shall:

1. Recognize and promote the participation of other organizations that may contribute to the shared interests of monitoring and researching the North Pacific marine environment; and
2. Establish a mechanism through which new participants can participate in planning for research and monitoring.

Section IX. General provisions

1. Effective date. This MOA becomes effective upon the date of the signature of the last Party to execute it. This MOA may be executed in counterparts, each of which will be considered an original document.

2. Withdrawal. Any Party to this MOA may withdraw without obligation upon thirty days written notice to the other Parties.

3. Termination. This MOA shall remain in effect until it is terminated by agreement of the Parties.

4. Authority. Nothing in this MOA shall be construed to limit or modify the authority or responsibility of any participating agency.

5. Third parties. This MOA is not intended to, nor shall it, vest rights in persons or entities who are not Parties.

6. Amendment. This MOA may be amended in writing by the unanimous written agreement of the Parties.

7. Antideficiency. Nothing in this MOA shall be construed as obligating the United States, the State of Alaska, or the University of Alaska, their agents or employees, to expend funds in excess of that authorized by law.

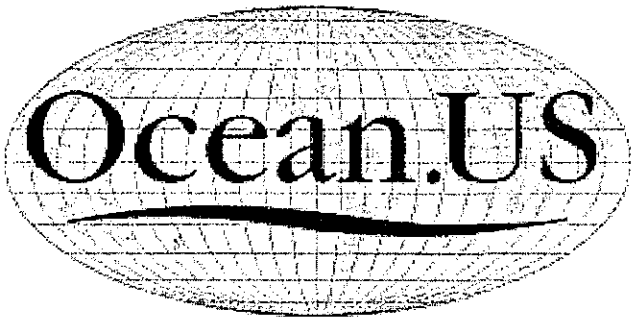
8. Effect. This MOA is intended to express the good faith plans and general intentions of the parties, but does not create any legally enforceable obligations.

9. Notice. Any notice, request, order, or communication to the Parties pursuant to this MOA shall be in writing to each Party at the address that follows:

or to such other addresses as any Party may designate in writing.

Signatures:
(This list will be an amendable document to allow for other agency participation)

- *Exxon Valdez* Oil Spill Trustee Council Executive Director
- Northern Pacific Research Board Chairman
- Northern Fund of the Pacific Salmon Commission Chairman
- University of Alaska President



An Integrated and Sustained Ocean Observing System For the United States:

Design and Implementation

May 23, 2002

Prepared by:

Ocean.US

The National Office for Integrated and Sustained Ocean Observations

EXECUTIVE SUMMARY

There is an immediate need for a sustained and Integrated Ocean Observing System (IOOS) that will make more effective use of existing resources, new knowledge, and advances in technology as the means to develop a unified, comprehensive, cost-effective approach for providing the data and information required to:

(1) improve the safety and efficiency of marine operations,
(2) more effectively mitigate the effects of natural hazards,
(3) improve predictions of climate change and its effects on coastal populations,
(4) improve national security,
(5) reduce public health risks,
(6) more effectively protect and restore healthy coastal marine ecosystems, and
(7) enable the sustained use of marine resources.

The development of such an integrated system will benefit those sectors of society that use or are influenced by the ocean from private enterprise and government agencies to the science and education communities, NGOs, and the public at large. Recent studies indicate that benefits will substantially exceed the required investment. For example, improved climate forecasts made possible by the El Niño tropical ocean observing system have been estimated to save the agriculture sector $300M/year. The system costs $10M/year to maintain and operate.

Rationale for an Integrated System

The oceans are critically important to our society. They are the birthplace of weather systems and modifiers of weather and climate; they are highways for marine commerce and a buffer for national security; they are a major reservoir of natural resources, havens for recreation, virtual schoolrooms for educators, and natural laboratories for science. Rapid growth in the number people living in immediate proximity to the ocean is placing conflicting demands on coastal ecosystems that threaten their integrity and capacity to provide goods and services. This demographic tend is also placing an increasingly large segment of our society at risk to natural hazards. Improvements in the quality of live, effective management of the marine environment and sustained utilization of living resources depend on the ability to (1) rapidly detect changes in the status of marine ecosystems and living resources and to (2) provide timely predictions of changes and their consequences for the public good. **We do not have this capability today.**

Historically, the U.S. has responded to these challenges in an uncoordinated, piecemeal, *ad hoc* fashion. Consequently, when the programs of all government agencies with ocean related missions and goals are considered as a whole, they are not as cost-effective as they could be, and they do not provide data and information on the causes and consequences of human activities and natural variability rapidly enough to serve as a basis for timely and scientifically sound decision making – **the whole is less than the sum of its parts.** This need not be the case. Today, the rates at which data can be acquired, processed and analyzed are approaching the time scales on which our political, social and economic systems function. It is time to close the gap between scientifically sound analyses of changes in the oceans and the decision making process.

Conceptual Design

The IOOS must be operational (in the same sense as the weather forecasting system), and it must evolve as a partnership of government agencies (state and federal), private enterprise, scientists and non-governmental organizations. The ocean observing system is envisioned as a network that systematically acquires and disseminates data and information to serve the needs of many user groups (government agencies, industries, scientists, educators, non-governmental organizations, and the public). Achieving this goal depends on the development of a system that efficiently links ocean observations to data management and analysis for timely delivery of environmental data and information. This is the purpose of the IOOS, the implementation and evolution of which will selectively build on, enhance and supplement existing elements based on user group specifications – **the whole will be greater than the sum of its parts.**

The IOOS will develop as two interdependent components, a global oceanic component and a national coastal component. The **global component** of the IOOS is part of an international partnership to develop a global system (the Global Ocean Observing System, GOOS) designed to improve weather forecasts and climate predictions. The **coastal component** is a national effort concerned with the effects of the ocean-climate system and human activities on coastal ecosystems, living resources, and the quality of life in the coastal zone. This component is conceived as a federation of regional observing systems nested in a federally supported national backbone of observations, data management, and modeling. Regional observing systems would both contribute to and benefit from the national backbone and would enhance the national backbone based on regional priorities.

Emphasis here is on *in situ* observations. Although critical to the development of a fully integrated observing system, the recommendations here do not specifically address requirements for satellite-based remote sensing. Clearly, implementation of *in situ* elements of the system must be coordinated with and meet the requirements for the remote sensing elements of the system.

Developing the Initial System

The development of the IOOS requires the establishment of (1) a process for selectively incorporating, enhancing and supplementing existing programs; (2) an integrated data management subsystem; (3) procedures for selectively and systematically migrating new knowledge, technologies and models into the operational observing system; and (4) mechanisms for permanent and ongoing evaluations of system performance.

Development of the global component depends on:

- full implementation of Argo and the global ocean time series observatories,
- successful completion of the Global Ocean Data Assimilation Experiment (GODAE),
- optimizing the global network of observations, and
- enhancing the ocean time series observatories with key biological and chemical sensors.

Implementing the coastal component depends on:

- enhancing existing federal networks for *in situ* measurements from fixed platforms and tide gauges to improve spatial and temporal resolution and to expand the spectrum of measurements to include physical, chemical and biological variables; and
- building the National Federation by establishing regional observing systems as "proof of concept" projects with the goal of transitioning successful systems or elements of these systems into an operational mode as part of the IOOS.

Existing governance structures were not designed to implement, maintain, and improve a sustained and integrated observing system for coasts and oceans. Three approaches are described in this report that should be considered in the establishment of an effective governance mechanism.

Funding

Current Federal spending on ocean related research is approximately $600M, while spending for operational oceanography across all federal agencies and other stakeholders is roughly $1B. The additional annual cost of a fully implemented IOOS is estimated to be $500M in constant dollars. A phased, multi-year development of the IOOS is recommended to implement the system effectively and efficiently. To begin this effort, an initial investment of new money is required to (1) accelerate the implementation of the U.S. commitment to the global ocean observing system for climate change ($30M), (2) develop the data communications and management system required for the IOOS ($18M), (3) enhance and expand existing federal programs ($40M), and (4) develop regional observing systems ($50M). The total new investment needed to begin the phased implementation plan is estimated to be $138M.

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1. PURPOSE

This report, the first of three reports on the implementation of a national ocean observing system, summarizes (1) the rationale for an Integrated Ocean Observing System (The Problem), (2) the conceptual design of the System (Solving the Problem), (3) economic benefits of an integrated system, (4) first steps for implementation, and (5) the high priority actions and associated funding levels that should be implemented now (Conclusions). First steps and high priorities are based on the consensus that crystallized at the March 2002 Ocean.US workshop. The recommendations presented in this report build on the work of many national and international bodies and on two recent reports prepared under the auspices of the National Ocean Research Leadership Council (NORLC) of the National Ocean Partnership Program (NOPP): "Toward a U.S. Plan for an Integrated, Sustained Ocean Observing System" (submitted to Congress on 20 April, 1999) and "An Integrated Ocean Observing System: A Strategy for Implementing the First Steps of a U.S. Plan" completed in 2000.

Two reports will follow this one: (1) the Proceedings of the March 2002 Ocean.US workshop (to be completed by 1 June 2002) and (2) a multi-year, phased implementation plan with a time table and cost estimates (to be in Draft form by 1 September, 2002). The latter, which will be developed in partnership with the federal agencies of NOPP, is intended to be a strategic plan that charts the way forward based on current knowledge and technical capabilities. It is also intended that this plan be subject to annual review and updating as the number of users grows and their needs diversify, and as new knowledge and technologies become available.

2. THE PROBLEM

2.1 Detecting and Predicting Change

The oceans surrounding the United States are our lifelines to national and international commerce and a tie to our historical roots. They are sources and modifiers of our weather and climate; they are buffers for national security; they are major reservoirs of living and non-living resources, are places of recreation, and subjects of scientific research aimed at understanding the "water planet" called Earth.

Ocean environments are undergoing profound changes as a consequence of two contemporary global patterns of great significance to the health, safety and well being of the U.S. population: (1) the increase in both the size of the human population and the proportion of that population living in the coastal zone and (2) climate change. As the number of people in the coastal zone continues to increase rapidly, the demands on coastal systems to provide commerce, recreation, and living space and to receive, process, and dilute the effluents of human society will continue to grow. Increasing coastal populations are placing a larger fraction of our society at risk from natural hazards. At the same time, coastal ecosystems are undergoing changes that are likely to affect their capacity to provide these services.

	DRIVERS OF CHANGE
Natural & Anthropogenic	• Global climate change • Storms & other extreme weather events • Seismic events • Ocean currents , waves, tides & storm surges • River & ground water discharges • Physical restructuring of the environment • Alteration of the hydrological cycle • Harvesting living & nonliving resources • Alteration of nutrient cycles • Sediment inputs • Chemical contamination • Inputs of human pathogens • Introductions of non-native species
	PHENOMENA OF INTEREST
Climate, Marine Services, Natural Hazards, & National Security	• Increasing heat content of the oceans • Sea level rise • Changes in sea state • Changes in coastal circulation • Coastal flooding • Shoreline changes • Change in shallow water bathymetry
Public Health	• Chemical contamination of seafood • Exposure to human pathogens
Ecosystem Health	• Habitat modification & loss • Changes in biodiversity • Coastal eutrophication • Harmful algal events • Invasive species • Biological affects of chemical contaminants • Chemical contamination of the environment • Disease & mass mortalities of marine organisms
Living Marine Resources	• Changes in the abundance of exploitable living marine resources • Capture fisheries: changes in landings (plants and animals) • Aquaculture: changes in harvest

Table 1. Natural and anthropogenic drivers of change and associated phenomena of interest in coastal marine ecosystems that are the subject of the IOOS.

Improving the capacity to detect changes regionally and globally and predicting how global-scale drivers alter coastal ecosystems are major objectives of the observing system. Of primary concern are

- Basin scale processes such as El Niño, the Pacific Decadal Oscillation, and the North Atlantic Oscillation;

- Global climate change, and its effects on temperature, weather patterns, and sea level;
- Changes in inputs of water, sediments, nutrients and contaminants from coastal drainage basins;
- Exploitation of living marine resources;
- Seismic events, and
- Global movements of ships and cargo.

Coastal ecosystems are subject to focused impacts from land, sea and air. **This underscores the importance of continuing and improving observing systems designed to measure the influences of water and associated materials from the land to the sea.**

2.2 Too Much, Too Little and Too Late

Effective management and sustained utilization of the marine environment and its resources depend on our ability to detect and predict changes in the status of coastal ecosystems and living resources on local to national scales. **We do not have this capability today.** In the continued absence of a system for improved detection and prediction of global and coastal changes and their environmental and socio-economic effects, conflicts will increase between commerce, recreation, national security, development, conservation, and the management of living resources. The adverse social and economic costs of uninformed decisions will increase accordingly.

There is an immediate need for a sustained and integrated ocean observing system that will make more effective use of existing resources, new knowledge, and advances in technology as the means to:

- Improve predictions of climate change and its effects on coastal populations,
- Mitigate more effectively the effects of natural hazards,
- Improve the safety and efficiency of marine operations,
- Improve national security,
- Reduce public health risks,
- More effectively protect and restore healthy coastal marine ecosystems, and
- Sustain marine resources.

In the past, each of these seven goals (and often subsets of them) has been addressed through the development of independent programs that serve the specific purposes of a limited number of user groups for relatively short time periods. The federal, state, and private mechanisms established to fund and implement these programs were not designed to support a sustained, comprehensive and integrated approach to meeting these goals. Consequently, we suffer from the paradox of **too much** (redundant programs with little or no outside coordination or communication), **too little** (few if any programs are sufficiently comprehensive), and **too late** (current procedures for acquiring, processing, and analyzing data are too slow relative to the decision-making process). **We must broaden our concepts and develop mechanisms for sustaining an integrated system of observations, data management and analysis to provide timely responses to user requirements.**

2.3 Why Now?

The development and implementation of scientifically sound environmental policies for effective management and sustainable utilization of global and coastal environments and resources have been slow and limited in scope for two major reasons. First, the rate of data acquisition, processing and analysis for basic research is too slow to effectively aid the decision-making process. We must improve and streamline current mechanisms by which data are communicated, managed and analyzed. Second, the gap between scientific knowledge and public understanding of environmental issues is wide and growing wider. An observing system is needed that provides routine and rapid access to data and information to close these gaps.

Although the challenges are significant, we are witnessing a convergence of societal needs and technical capabilities that provide the motivation and means to begin the implementation of an integrated and sustained ocean observing system. The time is right to develop an observing system that (1) is based on sound science; (2) is responsive to the information needs of many user groups; (3) makes more effective use of existing resources, knowledge and expertise for the public good; (4) provides a direct window to the ocean environment for research and public education; and (5) provides a framework that will enable government agencies to achieve their missions and goals more effectively.

3. SOLVING THE PROBLEM

3.1 An Integrated and Sustained System

The IOOS is envisioned as a national and international network that systematically acquires and disseminates data and products in response to the needs of government agencies (from resource management and land-use planning to emergency response and national defense), industries, scientists, educators, non-governmental organizations, and the public. Use of these data for both detection and prediction depends on the development of a system that effectively links ocean observations to data management and analysis for more timely access to data and delivery of environmental information. Thus, the system will consist of three linked subsystems for data acquisition, management and analysis (Figure 1) that are designed, implemented, operated and evaluated in terms of user needs.

In some ways the National Weather Service provides a model for the development of IOOS. While the issues relevant to atmospheric observations and prediction are not as multi-dimensional as those required for the IOOS, the NWS maintains a system of observations, data management and analysis designed to provide weather forecasts and warnings for the public good. Today, the NWS supplies meteorological data and products, in accordance with national standards, to private enterprise, scientists and educators who generate value-added products to meet specific needs. Timely delivery of data and products (e.g., weather nowcasts and forecasts) are made possible by linking real-time data streams to models via effective data management.

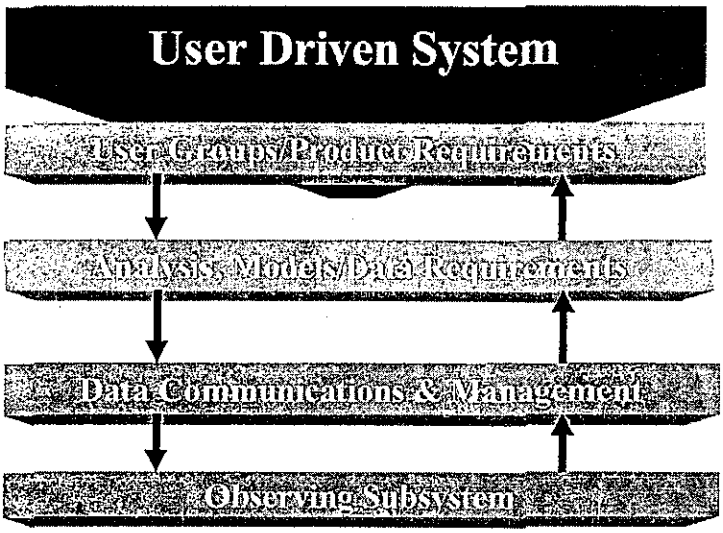

Figure 1. Linking user needs to measurements requires a managed, two-way flow of data and information among three essential subsystems: (1) observations (2) data communications and management, and (3) modeling and data analysis. The IOOS is "user-driven" in that the user needs determine what variables are measured, how data are managed and analyzed, and the speed with which quality data and data-products become available to users.

Unlike the NWS, ocean observing systems have been initiated and maintained by many different agencies, universities, industries, and other organizations. Consequently, the process for establishing an integrated ocean observing system can be compared to assembling a patchwork quilt. Some pieces of the quilt already are in place, others are ready to be installed, and others have yet to be designed or imagined. With time, some will be replaced as technology advances, understanding increases, and needs evolve.

3.2 The Two Components of IOOS

The IOOS will develop as two related and linked components: (1) a global, oceanic component, and (2) a national coastal component. The global component is part of an international collaboration that will provide the means to improve nowcasts and forecasts of weather, surface wave and current patterns, and general circulation, and predictions of climate trends on a global scale, as well as boundary and initial conditions for higher-resolution applications in the coastal zone. It is of primary interest to users in the climate, defense, maritime commerce, research, and education sectors. The coastal component encompasses the U.S. EEZ, estuaries, and the Great Lakes (Figure 2). It is envisioned as a collaboration among state and federal agencies, industry, non-governmental organizations (NGOs), and academia. It is primarily concerned with the effects of weather, climate, and human activities on coastal ecosystems, living resources, and people who live, work and play in the coastal zone.

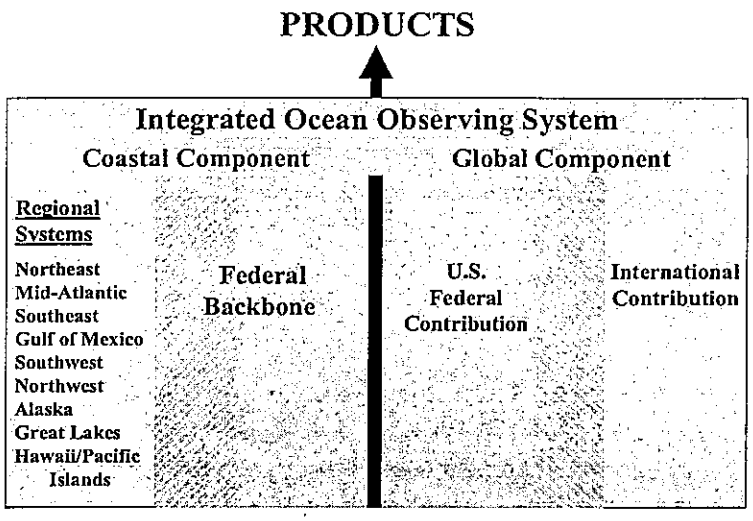

Figure 2. A schematic of the IOOS illustrating the relationships between the Federal contributions to the national coastal and the global ocean components. The global component is being developed as an international collaboration. The coastal component will develop as a national federation of regional systems in which regional systems contribute to and benefit from a federally supported national backbone of observations and data management (section 3.4).

3.3 The Global Component

The global component of the IOOS is part of an international effort to significantly improve our ability to detect and predict changes in the ocean-climate system on a global scale. Representatives from the international oceanographic (GOOS) and climate (GCOS) communities reached consensus on the next steps for the global module. The plan calls for an internationally sponsored and maintained global system of observations based on:

- Continued deployment of ocean observing satellites;
- Enhanced global observations of coastal sea level;
- Systematic observations of the ocean surface with modern techniques;
- An integrated upper ocean observing system for temperature (heat) and salinity (freshwater);
- A global suite of fixed time series stations; and
- Repeat surveys of ocean carbon and water column conditions.

Implementation is underway, but not complete. Elements of the observing system currently being implemented include (1) the Argo array of drifting, profiling floats designed to provide high quality oceanic data for global modeling; (2) the TAO/TRITON (tropical atmosphere ocean/triangle trans ocean fixed buoy network) array of data buoys in the equatorial Pacific Ocean for improved detection and prediction of El Niño and La Niña events; and (3) the Global Ocean Data Assimilation Experiment (GODAE). Support of national research programs is required to develop technology for the evolution of the global module and to evaluate and improve its effectiveness. The global module also calls for the use of cutting-edge technology to assimilate all available ocean data into products that can be used to evaluate changes in the state

of the global ocean for a wide variety of applications, to increase our understanding of the roles of the ocean in global climate variability, and to improve forecasts of future climate. The U.S. global component will fulfill the national contribution to the global module as well as provide initiative for the development of technology for national and international interests.

3.4 The Coastal Component

The design and implementation of the coastal component has lagged behind the global component. Impediments to the development of the coastal module include:

- The challenge of designing and implementing a system to detect and predict changes in a region as complex as the coastal zone;
- Inefficient and ineffective data communications and management of diverse data from many sources;
- The challenge of developing and maintaining technologies for sensing biological and chemical changes in near real-time;
- Lack of an accepted process for selectively transitioning new technologies and knowledge into an operational mode; and
- The challenges of developing partnerships between all stakeholders.

The Ocean.US workshop specifically addressed these challenges and determined that the time has come to implement the coastal component.

The coastal component is conceived as a **federation of regional observing systems nested in a federally supported national backbone of observations.** Regional observing systems will contribute to and benefit from the national backbone (Figure 3). This construct reflects two important realities: (1) environmental priorities vary among regions and states, and (2) there are common requirements for data and data processing that transcend state and regional boundaries and provide a basis for achieving economies of scale.

SIDE BAR

Regional Priorities and the National Backbone: For example, tracking the movement of lobster larvae to improve forecasts of recruitment may be a priority in the Gulf of Maine; movements of the Loop Current that endanger off-shore drilling operations might be a high priority in the Gulf of Mexico; the effects of an El Niño event on the distribution of fish stocks might be a high priority off California; while tracking coastal currents that are migratory pathways for whales, sea lions, and salmon may be a priority in the Gulf of Alaska. Observations of coastal circulation, temperature and salinity are required for all of these regional priorities, but because applications differ, the observing systems for each region will differ in terms of when and where measurements are made, the kinds of measurements made, the kinds of models used, etc.

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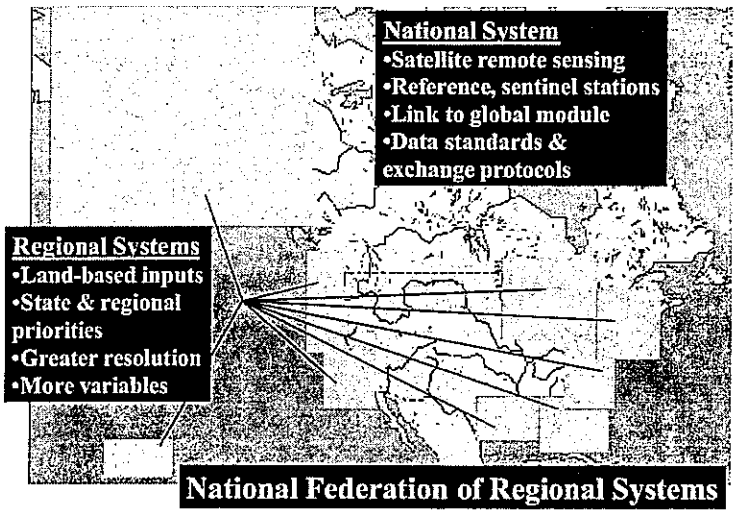

Figure 3. The coastal component of the IOOS will be a national federation of regional observing systems. Regional boundaries are shown for conceptual purposes only. Although there may be a rough correspondence to the regions listed in Figure 2, in actual practice, boundaries will be determined by regional priorities.

The purpose of the national backbone is to maintain and operate the observing and data management infrastructure that will benefit the nation and regional observing systems in several important ways:

- establish a network of reference stations (to provide baseline data required to assess the significance of local variability) and sentinel stations (to provide early warning indicators, i.e., advanced warnings of events and trends and to allow adaptive monitoring for improved detections and predictions);
- establish standards and protocols for measurements, data exchange and management (for rapid access to diverse data from disparate sources);
- link the global component to regional observing systems (to detect and predict the effects of global scale weather and climate patterns on coastal ecosystems);
- enable comparative ecosystem analysis (required to develop operational models of ecological change);
- provide economies of scale that will improve the cost-effectiveness of regional observing systems by investing in a national system that minimizes redundancy and optimizes data and information exchange (the IOOS will be more than the sum of its parts); and
- facilitate capacity building within regions (to ensure that all states and regions can contribute to and benefit from the IOOS).

Specifically, the national backbone will measure and manage a set of core variables required to detect and predict most of the phenomena of interest associated with the seven goals (to achieve economies of scale). However, it is important to emphasize that **measurement of the core variables will not, by themselves, provide all of the data required to detect and predict**

changes in or the occurrence of all of the phenomena of interest. For instance, in the areas of public health, ecosystem health and living marine resources, it is likely that more variables will have to be measured with greater resolution on regional scales.

3.5 Governance Considerations

The IOOS must be nationally coordinated and regionally relevant, and it must enable government agencies and other user groups to fulfill their missions and achieve their goals more effectively. At present, there is no coherent governance structure that provides an efficient mechanism to achieve these goals. New approaches to governance will be needed for the development of both the national backbone and regional observing systems. We focus here on the federal level where several governance options could provide the basis for achieving a coordinated approach to implementing, developing and operating the IOOS. Options include:

- The establishment of an interagency ocean observing Integrated Program Office (IPO) that would administer and control funding for the observing system similar in nature to the IPO established for the National Polar-orbiting Operational Environmental Satellite System (NPOESS) Program. Such a program would require individual federal agencies to establish identified program lines within their budgets for the interagency ocean observing program.
- The establishment, through interagency Memoranda or Agreements, or similar documents, of mechanisms that would coordinate bilateral, trilateral or more inclusive interagency partnerships in ocean observing for specified periods of time. Ocean.US is an example of a program based on interagency cooperation codified by a Memorandum of Agreement.
- The continuation of the present federal governance of ocean observing that is agency-specific with no explicit identification of funding dedicated to an interagency, integrated ocean observing effort. These efforts could be funded based on agencies' determination of how such efforts met their individual mission requirements.

Inherent in the question of governance is the issue of transitioning technologies and knowledge developed through research to an operational status. It is likely that the governance structures for the research and operational arms of the IOOS will be quite different since the goals and programmatic time scales differ markedly between research and operations. An effective governance structure leading to national leadership and coordination is required to enable and promote:

- cooperation and collaboration among federal and state agencies to enable the nation-wide development and implementation of economically and ecologically sound environmental policies;
- efficiencies in the design and implementation of regional programs and the timely incorporation of new technologies, models and products;
- capacity building through training programs and infrastructure development;
- measurement of core variables by all regional observing systems using nationally accepted methods and quality assurance/quality control (QA/QC) standards;
- dissemination and management of data for the benefit of all;

- development of the IOOS in the international framework of GOOS; and
- sustained, predictable and performance-based funding to insure uninterrupted data streams and routine provision of data-products.

New mechanisms are needed that enable federal and multi-state collaboration in the allocation and management of funds and the periodic assessment of each regional system. To be successful, the governance of regional programs must harmonize "bottom-up" programmatic development through regional organizations of stakeholders (data providers and users) with "top-down" coordination by federal agencies and national organizations. The success of this approach will depend on the development of programs that are comprehensive in design and enjoy continuity of support.

3.6 Research and the Development of the IOOS

The Nation's investment in oceanographic research and development provides the foundation for the design and implementation of the IOOS. Continued investment will be required to develop, operate, and maintain a fully integrated observing system. Research is essential for the evolution of the IOOS in at least two ways:

- Scientific knowledge, technologies, scientists, and engineers provide the continuing foundation for the design, implementation, and development of the IOOS;
- Long-term observations made for the purposes of science significantly contribute to the multiple use capacity of the IOOS.

Today, we are unable to adequately address many of the seven goals given above (section 2.2) for three reasons:

- Lack of mechanisms for efficiently sharing observations and data throughout the research community;
- Inability to rapidly sense changes in the biology and chemistry of the oceans; and
- The knowledge required to construct models that can be used to predict changes in the capacity of ecosystems to provide goods and services is insufficient.

Realization of the full potential of the observing system will require (1) advances in technology to improve our ability to detect changes in the marine environment, especially biological and chemical properties and processes; (2) advances in understanding and related development of operational models that can predict change with known certainty; and (3) improved outreach activities (e.g., education, training and marketing) to ensure the most effective uses of environmental data and information (multiple use).

Government agencies, academia, and other stakeholders are responding to these needs by expanding our ocean knowledge base through research and development initiatives. For example, fixed point observatories could function as test beds and incubator sites for the development of new technologies (sensors, power sources, data telemetry) and modeling capabilities essential to the evolution of the IOOS.

Moreover, access to multidisciplinary, sustained observations provided by the IOOS will be invaluable to the research community and science educators, and as a result, will increase the impact of the Nation's investment in the sciences. The data streams and information provided by the observing system will stimulate the advancement of science by contributing to the development of more comprehensive and accurate representations of how and why the oceans and coastal ecosystems are changing in both time and space. Such a synergy between science and the evolution of the IOOS must be cultivated and sustained to achieve the full benefits of both.

4. BENEFITS

Substantial economic benefits are expected from the IOOS, both in its capacity for improved and expanded ocean observations as well as its integrated nature. Recent studies demonstrate that the economic benefits of investing in ocean observations to improve weather and climate forecasts can be substantial. For example, improved forecasts of El Niño events have led to adaptations in agricultural planning as well as hydroelectric power generation. In the case of the 1997 El Niño event, economists estimate that the agriculture industry saved $300M. The tropical ocean observing system costs $10M/year to operate. Weather and climate predictions can be substantially improved with improved ocean measurements of other basin scale processes (e.g., the North Atlantic Oscillation and the North Pacific Decadal Oscillation). With improved predictions come enhanced economic benefits, not only for agriculture and power generation, but also for mitigating the effects of natural hazards, environmental protection, sustaining living resources, and coastal zone management. On a regional scale, a recent study of the Gulf of Maine illustrated the economic benefits of an integrated observing system for search and rescue, mitigation of oil spills, commercial fisheries, recreation and maritime transportation. A conservative analysis of the value of an ocean observing system for this region and for these sectors alone concludes that benefits will exceed the investment by a factor of ten.

The cost of not implementing the IOOS, of not improving and expanding our current ocean observational capacity, can be equally, if not more, substantial. The occurrence of biological phenomena presents a potential threat to public and marine health as well as to local and national economies. Enhancements to coastal observing systems could improve our response to episodic, deleterious events, such as harmful algal blooms of Florida red tide, toxic diatoms in California, and *Pfiesteria* in the Mid-Atlantic region. These events can pose risks to humans and marine life, and public concerns regarding recreation and seafood consumption can cause substantive economic impacts even if the risks are not realized. A robust, integrated observing system would allow advance preparation where the risks are real and reduce costly overreaction where they are not.

To determine the exact cost-benefit of the IOOS, it is necessary to conduct user sector studies on how IOOS data and products will differ from those currently available, their incremental costs, how the information is used in decision-making, and how that information improves outcomes in economic activities. The implementation of the IOOS includes this cost-benefit economic analysis, which will help in prioritizing areas of expansion as well as evaluate the effectiveness of the system. To develop useful economic characterizations of the IOOS products and ultimately develop a complete assessment of the cost-benefit of the IOOS, economists have already provided specific recommendations that will allow robust economic analyses for all regions to be conducted.

Public awareness of the value of the IOOS is critical to the success of the system and its continued support, and economic evaluation is key to demonstrating that value. The potential for an operational system (e.g., real-time visualization of underwater "weather" and the activities of marine organisms) for the purposes of science education and the development of an environmentally literate public is enormous and will be capitalized on.

5. IMPLEMENTING THE IOOS

5.1 Setting Priorities

The Ocean.US-2002 Workshop, convened in partnership with the U.S. GOOS Steering Committee, provided the information required to formulate a phased implementation plan for the IOOS. The workshop also achieved a consensus on (1) a prioritized list of variables that should be measured, (2) the techniques for providing the required data streams, (3) guidelines for the formulation of a phased implementation plan based on both feasibility and need, and (4) the immediate need to design and implement an integrated approach to data communications and management. The workshop proceedings will be published in a separate document, and a working group has been established to formulate an action plan for implementing the integrated data management subsystem for the IOOS.

Prior to the workshop, teams of experts were formed to draft subgoals and provisional products for each of the seven national goals to be addressed by an integrated system (section 2). Once reviewed and agreed to by workshop participants, the subgoals and products were used to develop full lists of environmental variables and potential techniques. Variables were then ranked based on the number of subgoals they are relevant to. The highest ranked variables are recommended for incorporation into the national backbone of observations. Potential techniques (platforms, sensors, methods) were then evaluated based on their feasibility and their importance to providing the data required to detect and predict changes in the phenomena of interest (Table 1). These procedures and results are described in more detail in the Proceedings of the Ocean.US-2002 Workshop. The impact-feasibility analysis and the ranking of variables provided the basis for achieving a consensus on high priority actions needed to develop an IOOS for the Nation. The actions recommended below are intended to significantly improve the ability of government agencies to achieve their missions and the goals articulated in section 2.

5.2 The Observing System as a Whole

Two overarching recommendations focused on (1) the need for an integrated approach to data dissemination and management and (2) the establishment of government processes to build and sustain an operational observing system for coastal and oceanic environments. These are described below.

5.2.1 Data Communications and Management

The development of an integrated data management system for rapid access to diverse data from disparate sources is the highest priority for implementation. The interface with the IOOS for most users will occur through the Data management and Communications subsystem (DAC).

The DAC will knit together the global and coastal components of the IOOS and will link every part of the observing system from the instruments to the users, and will contribute to defining the quality of the end products. The DAC subsystem is required to transmit multidisciplinary, multi-media observations from a broad range of platforms, and transmit them (in real-time, near-real-time, and delayed modes) directly to users for processing into maps, plots, forecasts, and other useful forms of information. The goal is to link data from buoys, autonomous drifters and vehicles, ships, aircraft, satellites, observatories, and other platforms to models (e.g., GIS, numerical models, statistical models) for rapid analysis and product delivery, while ensuring data quality and usability.

The DAC subsystem consists of data transport and quality control; data assembly and metadata management; data archeology, discovery, archival, and product development; and associated administrative functions. Two general actions are recommended:

- Design and implement an enhanced, distributed data and information management system that links all observational and data management systems (across agencies and programs) to all data users.
- Improve data management infrastructure.

More specifically, nation-wide standards, protocols and formats should be developed as follows:

- Assess oceanographic middleware protocols for data acquisition and modify as needed to accommodate multi-disciplinary data streams (meteorological, physical, geological, chemical and biological data);
- Use the Federal standard for semantic metadata descriptions of the data;
- Use HTML as the network data transport protocol for data discovery; and
- Designate GODAE as a primary integrator for real-time data assembly.

5.2.2 Building the System

Involving all major stakeholders (data providers and users) in the development of the observing system early on in the process is essential to the evolution of an effective system that can be sustained in perpetuity. To these ends, Federal processes should be established for

- selectively incorporating (linking), enhancing, and supplementing existing operational programs;
- selectively and systematically migrating new knowledge, technologies and models into the operational observing system; and
- permanent and ongoing evaluations by stakeholders of system performance in terms of continuity and timeliness in the provision of data streams and products, product development and expanding the user-base, science education, public outreach (including environmental education K-gray), and the cost-effectiveness of the observing system.

5.3 The Global Component

The global component of the IOOS will fulfill and optimize the national contribution to the global module (section 3.3). An internationally coordinated effort is leading to the development of a Global Ocean Observing System (GOOS, to which the U.S. global component contributes) that will significantly improve our understanding of changes in the global ocean-climate system and our ability to rapidly detect changes and predict their consequence. The specific actions that should be taken now to ensure successful implementation of the U.S. global component are as follows:

- Increase the temporal and spatial resolution of ocean observations by fully implementing Argo and the global ocean time series observatories and by enhancing the ship of opportunity and volunteer observing ships programs (SOOP and VOS);
- Contribute to the successful completion of the Global Ocean Data Assimilation Experiment (GODAE) as the first step toward the development of an integrated data management and assimilation system for ocean observations;
- Enhance oceanic time series stations with biological and chemical sensors (bio-optics, nutrients, dissolved oxygen, pCO2);
- Develop and implement quantitative observing system design methodology to optimize the global network of observations for climate (e.g., Observing System Simulation Experiments or OSSEs); and
- Transition remote sensing capabilities from research to operational modes for sustained observations of ocean topography, ocean vector winds, and ocean color.

5.4 The Coastal Component

5.4.1 Implementation Strategy

The coastal component of IOOS will address an exceptionally broad spectrum of phenomena (Table 1). While it is not reasonable for the national backbone to comprehensively characterize all of these changes, it is feasible to develop a framework that will enable regional observing systems to provide the data and information required for rapid detection and prediction based on national and regional priorities.

Current understanding of the relationships between physical and ecological processes suggest there is a relatively small set of variables that, if measured with sufficient resolution for extended periods over sufficiently large areas, will serve many needs from forecasting the effects of tropical storms and harmful algal events on short time scales (hours to days) to predicting the environmental consequences of human activities and climate change on longer time scales (years to decades). These are the "core" variables.

The data requirements for improved coastal marine services are, for the most part, common to all of the themes to be addressed by the coastal module (Figure 4). Safe and efficient **coastal marine operations, national security activities, and the mitigation of natural hazards** require accurate nowcasts and timely forecasts of storms and coastal flooding; of coastal current-, wave-, and ice-fields; and of water depth, temperature and visibility. In addition to these data, **minimizing public health risks**, and protecting and restoring **healthy ecosystems** require timely data on environmental variables needed to detect and predict changes in habitats and in

biological, chemical and geological properties and processes. Mitigating the effects of natural hazards and reducing public health risks also require a predictive understanding of the effects of habitat loss and modification (barrier islands, tidal wetlands, sea grass beds, etc.) on the susceptibility of coastal ecosystems and human populations to natural hazards. The demands of sustaining **living marine resources** and managing harvests (of wild and farmed stocks) in an ecosystem context require data on most of the above as well as timely information on population (stock) abundance, distribution, age- (size) structure, fecundity, year-class strength, migratory patterns, and mortality rates (including catch statistics). Figure 4 provides a conceptual framework for the phased implementation of the coastal component that recognizes two important realities: (1) all seven major goals can and must be addressed from the beginning and (2) current capabilities dictate an initial operational emphasis on physical variables relevant to all seven national goals. This provides the basis for the efficient, step-wise implementation of a national system that will supply the data and information needed to detect and predict changes in or the occurrence of most of the phenomena of interest.

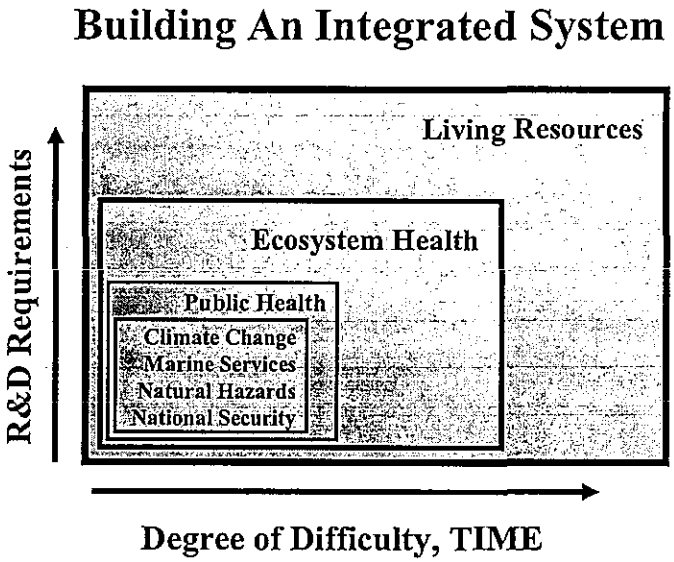

Figure 4. Time-dependent development of the IOOS.

5.4.2 Incorporate, Enhance and Supplement Existing Federal Contributions to the National Backbone

The Federal contributions to the national backbone include time series observations at reference and sentinel stations and cross-shelf transects and satellite remote sensing. This will be developed through both federal programs and federally funded regional initiatives as appropriate. An important goal is the development of procedures for integrating data from remote and *in situ* sensing to routinely provide three-dimensional, time-dependent visualizations of change. Achieving this will require the following initial steps:

- Enhance the existing federal network of instrumented moorings in the U.S. EEZ to improve forecasts of coastal weather, surface waves, and currents and to quantify related

changes in bio-optical properties. This should include increases in both the number of moorings by at least a factor of five and in sensing capabilities by incorporating physical, biological and chemical sensors; increasing the number of depths sampled; and developing standardized instrument packages.

- Enhance the existing federal networks to improve nowcasts and forecasts of water depth, currents, and both relative and absolute sea level rise. This should include increases in the number of water-level measuring sites by a factor of five and sensing capabilities (including an increase in the number of geo-referenced gauges, incorporation of additional sensors, and the development of standardized instrument packages).
- Develop and deploy new satellite sensors to improve resolution (to 300 m) of ocean color, surface currents and waves in coastal waters.
- Enhance aircraft remote sensing for ecosystem assessments for more timely detection of coastal erosion and changes in ocean color and shallow water bathymetry.
- Enhance national program of ship-based cross-shelf surveys to establish reference and sentinel transects of multidisciplinary observations (assess the effects of land-based sources of pollution and to improve stock assessments of exploitable fish stocks).
- Periodically produce digital maps (e.g., five-year intervals) of marine habitats of the areal extent of coral reefs, sea grass beds, kelp beds, mangrove forests, marsh grasses, soft and hard bottom substrates, and shallow water bathymetry.
- Enhance shore-based measurements in near-shore waters of human pathogens, harmful algae, biotoxins, and chemical contaminants.
- Develop standardized sensor packages and deploy them on research vessels, voluntary observing ships and ships of opportunity
- Develop glider platforms for synoptic, autonomous, *in situ* sensing of both physical and biological variables

5.4.3 Establish a National Federation of Regional Observing Systems.

The federation should include the development of a federally funded backbone as described above and in section 3. The backbone should be regionally enhanced based on state and regional priorities. Regional observing systems provide the primary interface with user groups outside the federal agencies. The regional scale also provides a focal point for data analysis and product development that will have local, regional and national applications. Thus, **the development of regional systems must be considered a high priority as follows:**

- Establish mechanisms that enable accountable transfers of funding from the Federal government to consortia of appropriate stakeholders (including both data providers and major user groups) charged with establishing, maintaining, and improving regional observing systems;
- Fund regional observing systems as proof of concept projects. These systems must include all three subsystems (data acquisition, management and analysis) and must contribute to and benefit from the national backbone.
- Establish a process to transition successful projects into sustained, regional observing systems where success is defined in terms of benefits to user groups and the cost-effectiveness of the observing system (from measurements to data products).

- Ensure that products are developed to address regional and national goals and that such products are readily available to the public and other users. This will place a high priority on the development of data assimilation techniques and predictive models.
- Develop and implement quantitative observing design methodology to optimize coastal observations for detection and prediction of regional expressions of basin scale changes in the oceans and of changes related to land-use practices in coastal drainage.
- Implement networks of high frequency radar as part of regional observing systems for coastal currents and waves.

5.5 Longer Term, High Priority Efforts

Important aspects of the system will take longer to develop and implement. With this in mind, continued research should be fostered in the following areas:

- Develop operational, coupled physical-ecological and physical-chemical models and data assimilation techniques for nowcasting and forecasting changes in the condition of ecosystems (sediment and chemical transport, habitat loss, oxygen depletion, harmful algal blooms, diseases and mass mortalities in marine organisms, etc.) and the living resources they support.
- Develop aircraft remote sensing techniques for ecosystem assessments based on the changes in the distribution and physiological state of biologically structured habitats, sea surface salinity, and turbidity.
- Develop improved techniques for rapid sensing of biological and chemical variables, especially human pathogens, harmful algal species, and biotoxins.

6. CONCLUSIONS

Federal support for developing, capitalizing and maintaining the national contributions to the global and regional coastal components of the IOOS will be substantial. The global component is entirely a federal effort. Federal funding will be required in three categories to initiate the coastal IOOS as follows: (1) link and enhance federal elements of the national backbone (including observations and data management), (2) implement and link regional observing systems that will contribute to and benefit from the national backbone, and (3) enhance the regional systems in response to state and regional needs. While continued federal support is necessary for the first two initiatives of the coastal component, initial federal funding is required for regional enhancements with the expectation that successful investment in enhancing regional systems must eventually result in an increase over time in the proportion of funding derived from state and regional sources. Based on the priorities established above and the cost-effectiveness of a systematic and step-wise approach to implementation, the following actions should be taken now:

- Accelerate the implementation of the U.S. commitment to the global ocean observing system for global climate change. Resources required now: $30M
- Initiate a Data Communications and Management system for the IOOS. Resources required now: $18M

- Enhance/expand existing Federal Elements (buoys, water level sites, etc.). Resources required now: $40M
- Initiate Regional Observing Systems as Proof of Concept trials. Resources required now: $50M.

The total new investment required to initiate a sustainable path to full implementation of the IOOS is $138M. The estimated annual cost of a fully-realized, integrated and sustained coastal and open ocean observing system in constant dollars is $500M. This level of investment will be approached over a multi-year period to ensure efficient use of resources and to allow sufficient time for capacity building to enable successful attainment of the project's goals. Emphasis here is on in situ observations. Although critical to the development of a fully integrated observing system, the recommendations here do not specifically address requirements for the satellite-based remote sensing.

Existing governance structures were not designed to implement, maintain, and improve a sustained IOOS such as that described here. Three approaches are suggested (section 3.5) for consideration as mechanisms to address three critical issues: (1) the establishment of the IOOS through coordinated development of the global and coastal components and, within the coastal component, a federal backbone and regional observing systems; (2) the timely and selective migration of new capabilities (knowledge, technologies, models) from research to the federal backbone and regional systems with appropriate levels of sustained funding based on performance; and (3) routine and regular performance evaluations by stakeholders based on the provision of uninterrupted data streams and products and the evolution of new capacities in response to improved definition of user needs and an expanding user base.

DRAFT

A WHITE PAPER

ON

A COASTAL ALASKA OBSERVATORY SYSTEM

CAOS

Prepared by Two Crow (AKA J.D. Schumacher)

For the Executive Committee of CAOS

21 October 2002

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1.0 VISION AND STATEMENT OF MISSION

Our vision is that CAOS will aid in the preservation of Alaskan living resources, ecological diversity and vitality, and way of life for the good of all future generations.

The mission of CAOS is to help its members to work together to (1) provide quality, comprehensive observations from a permanent monitoring system, and (2) provide information products from processed data and model simulations (Figure 1). By coordinating their efforts, the members of this consortium (CAOS) will be better able to monitor Alaska's coastal environment and provide more comprehensive data and information products to all users.

Figure 1. A schematic of CAOS showing its objectives of monitoring and processing data using various models in order to provide informational products for users.

Information products are 'value-added' data, that is, data that have been processed using various models to enhance their value. From these products, users can develop a more complete understanding of how natural and human induced changes to the coastal environment affect ecosystem vitality and dynamics, sustainable fisheries, natural hazards both at sea and to coastal communities, and risks to public health.

This knowledge will permit wiser management of human impacts and better-informed responses to natural phenomena in Alaska's air-land-and-sea. In the making of decisions and policies on human use of natural resources, and in addressing questions of public health and coastal zone management, decision makers must have accurate, comprehensive and quality information upon which wise choices can be made. In this way, the Peoples of Alaska can best prepare for, adapt to and forecast changes that are occurring.

2.0 INTRODUCTION: WHAT IS CAOS?

CAOS will be a consortium that is formed based on its members' recognition of the value and timeliness of the CAOS mission. This consortium will include federal/state government agencies, native Alaskan entities, academic institutions, non-governmental institutions and the private sector (Figure 2). The strategy we choose for building CAOS is to recognize that many of its parts already exist; extensive monitoring is being conducted. These entities and their ongoing commitment to monitoring will form the foundation for CAOS. The challenges are (1) to get the existing parts to work together to produce timely, accessible information relevant to the needs of the people of Alaska, and (2) to fill in the parts of the monitoring system that are missing to form a more complete observational network. The consortium will be the web that provides connectivity among

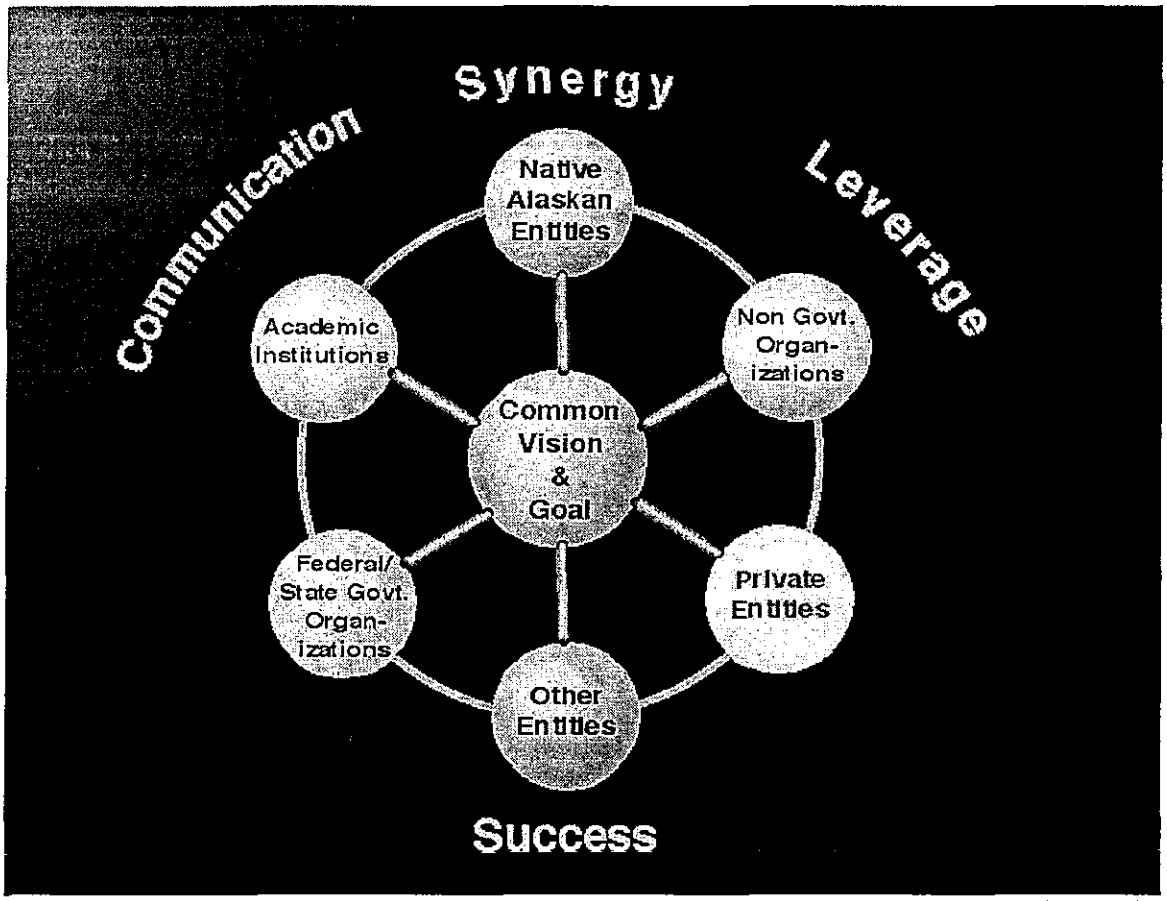

Figure 2. A schematic of the CAOS concept.

existing observational and monitoring programs and also serves as a stepping-stone for both enhancing ongoing programs and generating new innovative programs to observe our environment.

CAOS is an appropriate name for this consortium because many of the earth's systems are naturally chaotic. The hallmark of a choatic system is that minute changes in initial conditions result in huge differences at some later time. Because the atmosphere is a chaotic system, its uncertainties, no matter how small, will eventually overwhelm any calculations and defeat the accuracy of a long-term forecast. This principle is sometimes called the "Butterfly Effect." In terms of weather forecasts, the "Butterfly Effect" refers to the idea that whether or not a butterfly flaps its wings in a certain part of the world can make the difference in whether or not a storm arises one year later on the other side of the world. Because of the "Butterfly Effect," it is now accepted that weather forecasts can be accurate only in the short-term, and that long-term forecasts, even made with the most sophisticated computer methods imaginable, will always be little better than guesses. Since atmospheric features such as the Aleutian Low and the Arctic Oscillation obey chaos and have a dramatic influence on the coastal waters, the ecosystems of Alaska are also marked by chaos. Given so much uncertainty, what can be done so that we can better understand our coastal environment?

Even with chaos as a principle of nature, the first Peoples of Alaska were able to both survive and thrive. How was this possible and what can we learn from their example? The indigenous people, in order to survive, had to be excellent observers of the environment. As those observations spanned many generations, with knowledge being passed down orally, it became apparent that within the chaos patterns existed. Today we have eyes in the heavens, we can 'smell' contaminants down to parts per trillion, we can feel the temperature of the water down to depths of thousands of meters, and our other senses are augmented by highly refined instruments that probe and measure the earth, sky and sea. Some of the patterns known to those who subsist on nature for food, shelter and clothing can now be quantified and identified on larger spatial scales than were possible in the past through various modern forms of monitoring. CAOS seeks to aid in discovering patterns in the coastal environment and to provide information products that allow that knowledge to be applied to solve day-to-day challenges.

3.0 WHERE WILL CAOS MONITOR?

Alaska has nearly 40,000 miles of coastline bordering two oceans and three seas, as well as numerous sounds, inlets and bays. This coastline is ~ 75% longer than all of the other US coastlines combined. While coastal waters are the main concern of CAOS, the connectivity among water bodies requires that CAOS include in its monitoring the adjacent oceanic and riverine waters. Both of these aquatic regions provide physical forcing mechanisms, chemical components and biota to coastal waters. Waters flowing northward along the coast of British Columbia influence conditions in the Gulf of Alaska. Similarly, conditions in the Gulf of Anadyr influence those in the northern Bering and Chukchi Sea. Because of this, CAOS must seek to establish relationships with partners in Canada, Russia and Japan.

While important to Alaska itself, the coastal waters are among the most biologically productive in the world, with over 50% of the nation's commercial fisheries sector centered in Alaskan regional waters. This resource is vitally important to the National economy and food supply. The eastern Bering Sea, for example, is home to a rich variety of biological resources, including the world's most extensive eelgrass beds; at least 450 species of fish, crustaceans, and mollusks; 50 species of seabirds; and 25 species of marine mammals. The abundant fish and wildlife of the Bering Sea have supported the lives and livelihoods of Asians and North American Peoples since prehistoric times. Presently, the U.S. Bering Sea fishery provides about 40% of the U.S. and about 5% of the world harvest of fish and shellfish. Bristol Bay supports the world's largest sockeye salmon fishery, and the snow crab fishery is currently the largest crustacean (by weight) fishery in the U.S. In addition to supporting a large portion of the nation's fishery production, the Bering Sea also supports 80% of the U.S. seabird population comprising 36 million birds. Many unique and endemic species such as red-legged kittiwakes and whiskered auklets further highlight the significance of the Bering Sea. This region's wetlands, coastlines and islands provide globally significant habitats for many additional wildlife species, and its natural history holds answers to critical questions about world history.

Based on characteristics of the physical environment and geography, the coastal waters of Alaska can be divided into 5 regions: Gulf of Alaska/North Pacific Ocean, Aleutian Island Chain, Eastern Bering Sea, Chukchi Sea and Arctic Ocean/Beaufort Sea. Of the world's oceans, the Arctic is the least known from a scientific perspective. It will be, however, the region most dramatically changed, with the most dramatic consequences, under the accepted scenario of global warming. The linked relationships of climate to oceanic phenomena and hence to Alaska's productive ecosystems are at the heart of the need for a permanent monitoring network.

4.0 WHY CREATE CAOS NOW?

4.1 Climate Change And Natural Impacts: Natural impacts are occurring in the land-air-sea environment of Alaska. The global climate has been, is now, and always will be in a state of change. How much of the global warming is due human influence and how much can be accounted for by natural fluctuations in Earth's climate is moot. The present warming is having severe impacts on many aspects of the Alaskan ecosystem and on the way of life of all Alaskan Peoples (e.g., BESIS, 1997), Huntington, H.P. (ed.), 2000). Marked changes have and will continue to occur in composition and abundance of living marine resources, and in their food sources in the North Pacific Ocean and Gulf of Alaska (e.g., Francis et al., 1998, Springer, 1998, Anderson and Piatt, 1999, Hollowed et al., 2001). Similarly, changes are occurring in the Arctic Ocean (e.g., Tynan and DeMaster, 1997, Grebmeier et al., 1995) and throughout the Bering and Chukchi Sea (e.g., Brodeur et al. 1999, Livingston et al., 1999, Hare and Mantua, 2001, Napp and Hunt, Jr., 2001). One cause of these changes is a shift in global weather patterns, which results in changes in the regional features of the atmospheric (Overland et al., 1999), oceanic (Stabeno et al., 2001) and terrestrial systems (Weller, 2000). For example, storm intensity, sea state, and sea ice extent/timing are among the features whose strength and frequency will likely change throughout Alaskan waters with climate change (Schumacher and Alexander, 1999, US GLOBEC, 1996). Extensive erosion of the shoreline is already impacting coastal villages. Because Alaska was home to numerous national defense sites, changes in landforms and the passage of time have conspired to release toxins into the environment and this has resulted in impacts to public health. The influence of natural hazards such as tsunamis and volcanic eruptions are well known to Alaskans.

4.2 Socio-Economic Concerns: In the United States, Alaska is unique in that so many of her Peoples' way of life is subsistence. For Alaska Natives, subsistence is not just a means of providing food on the table, it is the wellspring of all spiritual and cultural ceremonies. Alaskan Natives live adjacent to all of Alaska's coastal waters and depend on marine resources. For example, 65,000 Native Americans live on the shores of the Eastern Bering Sea (LME, 2002). The communities on the coast and various islands provide an excellent opportunity to have local monitoring nodes where facilities can be developed and local people trained to collect various observations (Draft Bering Sea Ecosystem Research Plan, 1998). Community involvement and incorporation of traditional knowledge in the GEM (Gulf Ecosystem Monitoring) program is critical to the program's long-term success (NRC, 2002). Throughout the regions that CAOS wants to coordinate and enhance monitoring efforts, Native Alaskan communities will have an important role, both as those who monitor and as users of the informational products.

While economic factors vary somewhat in the 5 regions, commercial and/or subsistence fishing and processing are always important. In the Gulf of Alaska region, timber, minerals, agriculture and tourism are other important aspects of the economy. In the Chukchi region, economic activity is primarily focused on exploitation of natural resources, including petroleum, natural gas and minerals. In the Arctic/Beaufort Sea region, twenty-one species of fish are harvested commercially. Some move seasonally between fresh water and the ocean. Fish such as char are anadromous species whose life cycles include annual migrations from winter habitats in fresh water to summer feeding habitats in salt water. Summer habitats are in coastal environments, which are vulnerable to industrial development. Economic activity is mostly concerned with the exploitation of natural resources (petroleum, natural gas, fish, and seals).

4.3 Human Impacts: It is clear that humans have impacted Alaska's coastal waters. For example, the catastrophe of the Exxon Valdez oil spill had marked impacts on the marine environment and the local peoples throughout Prince William Sound region. From the perspective of serving Alaska's need to better monitor and understand how her productive coastal ecosystems function, however, this catastrophe did produce the benefit of the creation of the Exxon Valdez Oil Spill Trustee Council (EVOS). EVOS first addressed the immediate challenges of research and damage assessment. As a result of the initial program, observational databases and model simulations were developed, which greatly enhanced our knowledge of how this ecosystem functions. Monitoring later became a priority and this led to the implementation of the Gulf Ecosystem Monitoring (GEM) program (National Research Council, 2002). This program will directly address environmental and human concerns throughout the northern Gulf of Alaska and its adjacent waters. GEM will be a critical component of CAOS.

A recent National Research Council committee was formed to review the potential causes for the decline and failure to recover of the western stock of Steller sea lions. This stock ranges from the northern Gulf of Alaska, west through the Aleutian Island chain and northward into the eastern Bering Sea. Both natural and human impacts are among the hypotheses for the populations decline. Whether the decline was predator or prey related (or both), humans have caused some of the decline. The declining population has implications for both subsistence Peoples and quality of life issues, as well as economic impacts. By law, the National Marine Fisheries Service is required to ensure that their actions, or actions authorized or funded by them, are not likely to jeopardize the survival or recovery of protected species, or damage their critical habitat. Hence, some actions have been taken that limit the pollock fishery. New regulations would further constrain commercial fishing activities and bring about significant social and economic disruption to Alaskans. The question is whether the existing data and informational products are adequate to answer why the sea lions are declining.

4.4. The Unique Role Of CAOS: The Steller sea lion issue is but one example of pressing issues that face all Alaskans. It is these types of management and policy-making challenges that will be served by CAOS. CAOS will bring together disparate entities in order to enhance communications among them. This often leads to synergy so that the

whole becomes greater than the sum of the individual parts. CAOS can help to add value to existing monitoring and data/model processing programs and help develop better informational products for users. CAOS will also enhance the ability of programs to acquire funds to either expand existing efforts and/or develop new monitoring technologies and programs.

4.5. Relation Of CAOS To A National Program

On the national level, the National Ocean Research Leadership Council (NORLC), a Cabinet-level group of 14 Federal agencies, has designated the establishment of the U.S. Integrated Ocean Observing System (IOOS) as its highest priority. The process was accelerated in 2000 with the creation of Ocean.US, a federal interagency office established by the National Oceanographic Partnership Program (NOPP). To date, nine agencies have agreed to participate in the Ocean.US endeavor. Establishment of IOOS is driven by both national and regional (multi-state) priorities for the data and information required to:

- improve predictions of climate change and its effects on coastal communities and the nation,
- more effectively protect and restore healthy coastal marine ecosystems,
- enable the sustained use of marine resources,
- improve the safety and efficiency of marine operations,
- reduce public health risks,
- more effectively mitigate the effects of natural hazards, and
- improve national security.

IOOS has designated 9 regions nationally where they want to develop or support the establishment of integrated monitoring systems. CAOS will fulfill this role for the Alaska region. Internationally, IOOS is the U.S. contribution to the Global Ocean Observing System (GOOS), a United Nations activity that also has global and regional/coastal aspects. More information on IOOS can be found at the web site Ocean.US.net

5.0 ORGANIZATIONAL STRUCTURE

The proposed organizational structure of CAOS relies on an Executive Director who has lead responsibility for the consortium's function. The Director will receive guidance from the Executive Committee and five standing committees: Information & Models, Peoples & Policies, Science & Technology, Economics and Education & Outreach. Other committees will be formed as needed (Figure 3). The responsibility of the Information & Models committee is to keep informational products at a state-of-the-art level. This means both delivery of information systems and upgrading models. The Peoples & Policies Committee has responsibility for encouraging and ensuring participation of Native Peoples and their Traditional Knowledge, both in terms of active participation in monitoring and as users of informational products. Further, this Committee has the responsibility of assisting in establishing relationships with partners in Canada, Russia

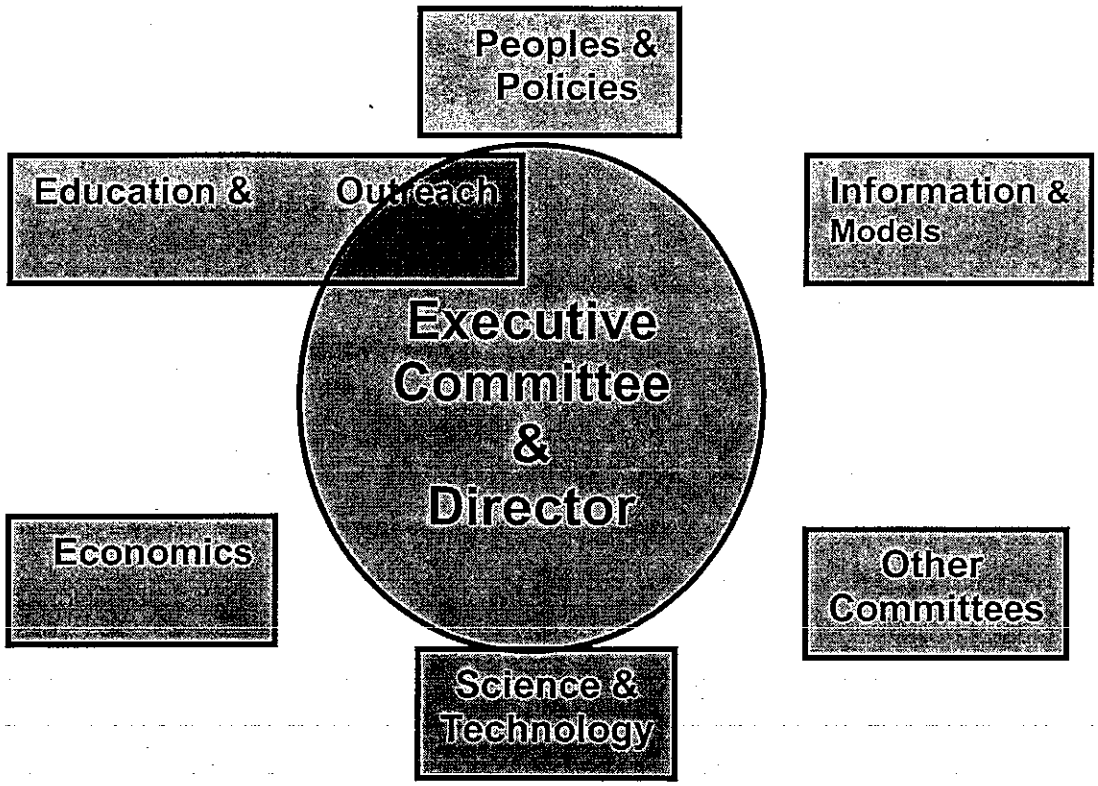

Figure 3. A proposed schematic of an organizational structure for CAOS.

and Japan. The Science & Technology Committee has the responsibility of providing scientific knowledge for planning new monitoring projects, ensuring that all monitoring adheres to a set of standard protocols and accuracies, and informing members of the consortium of new monitoring technologies and techniques. The Economics Committee has the responsibility of seeing that the benefits of ongoing monitoring efforts are well-documented and providing estimates of the value of future efforts. The Education & Outreach Committee has responsibility for ensuring that the informational products are made available to a wide spectrum of users, and to assist in the creation of programs that incorporate school children and rural communities.

6.0 CONSORTIUM STATUS

The first CAOS informational meeting was held on 21 September 2002 in conjunction with the American Association for the Advancement of Science conference in Fairbanks, Alaska. At that time, about 70 people attending the workshop were divided into six working groups to discuss their thoughts, concerns and guidance for CAOS. Several common themes emerged from the groups, including:

a. the need for international partners;

b. the importance of developing a compendium of current observing capabilities and monitoring programs, encompassing not only the coastal zone but also its adjacent watershed and oceanic regions;
c. the need to conduct an assessment of the outstanding needs of all potential users, including information products pertinent to the coastal environment for federal/state government agencies, native Alaskan entities, university and local school networks, and non-governmental private sector users;
d. the need to determine and include other environmental components to monitor (e.g., marine mammals and birds) that are not part of IOOS.

At the Executive Committee meeting that followed the workshop, it was decided that a White Paper needed to be produced as a first priority. The following proposed timetable contains other high priority tasks:

- Announce CAOS to all potential users via public announcements, OCEAN.US, direct emails and a web site with a White Paper.....December 2002
- Produce a compilation of ongoing monitoring efforts by data type and regions.....January 2003
- Produce an initial report identifying users and their informational product requirements. ..... January 2003
- Hold an Executive Committee meeting in Anchorage in conjunction with the symposium on marine sciences in the North East Pacific (13-17 January, 2003). Agenda to be determined.....January, 2003

7.0 ACKNOWLEDGEMENTS

The author acknowledges funding from Dr. Eddie Bernard, Director, Pacific Marine Environmental Laboratory/NOAA. He also thanks the following people for suggestions and comments on various components of this document: Phillip R. Mundy, Science Coordinator, EVOS Trustee Council, Craig Dorman, Vice-Chancellor for Research/UA, Charles Hocutt, Associate Dean/SFOS/UAF, Dave Musgrave, SFOS/UAF, Janet Intrieri, Environmental Technology Laboratory/NOAA, Jeff Napp, Alaska Fisheries Science Center/NMFS, Doug DeMaster, Director, Alaska Fisheries Science Center/NMFS, Eddie Bernard, Director, Pacific Marine Environmental Laboratory/NOAA. Suzanne K. M. Marcy, Arctic Program Manager, National Center for Environmental Assessment/EPA, and John Calder, Director, Arctic Research Office/NOAA.

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AYK Sustainable Salmon
Initiative Presentation

Arctic-Yukon-Kuskokwim
Sustainable Salmon Initiative

c/o Bering Sea
Fishermen's
Association
725 Christensen Dr.
Anchorage, AK 99501
907-279-6519

A New Collaborative Approach To Expanded Salmon Research in Western Alaska and the Bering Sea

Alaska salmon and freshwater fish have been critical to the survival of the people and wildlife in the Arctic-Yukon-Kuskokwim (AYK) region for thousands of years. Recent fluctuations (either natural or human-induced) in the annual abundance of these fish populations have created numerous hardships for the people and communities that depend so heavily on the salmon resource. Most salmon runs in western Alaska have been in decline for more than a decade. This precipitous drop in salmon returns have left fishery managers and scientists puzzled over the causes for the declines. Clearly, the causes for the declines are complex and involve interactions among variables such as the number of adult spawner returns, juvenile freshwater rearing and survival, and unknown marine factors.

Comment: I have a hard time with giving the word hardships a superlative if you'd like to express the extent of the hardships then maybe we can say "numerous hardships".

In response to the recent salmon declines, Native regional organizations have joined with State and Federal agencies to form an innovative partnership capable of cooperatively addressing salmon research and restoration needs. This partnership includes the Association of Village Council Presidents, the Tanana Chiefs Conference, Kawerak, Inc., Bering Sea Fishermen's Association, Alaska Department of Fish and Game, National Marine Fisheries Service, US Fish & Wildlife Service, Bureau of Land Management, Yukon River Drainage Fisheries Association, Bureau of Indian Affairs, National Park Service, and other AYK fisheries partners.

Comment: Joe – I cut this header because it seems as though this paragraph is still background, and flows so logically from the preceding paragraph that it seemed smoother to not break it up. See what you think.....

Congress, through the efforts of Senator Ted Stevens, appropriated $5 million to support this interagency, multi-disciplinary research effort to determine the cause decline of salmon in the region. The partners formalized their commitment with the creation of the **A-Y-K Sustainable Salmon Initiative (AYK SSI) and a Memorandum of Understanding (MOU)**. The MOU creates a process and structure to ensure a coordinated, inter-agency, multi-disciplinary approach to research planning and funding. This MOU testifies to the extraordinary collaborative spirit and momentum behind this AYK salmon research effort. This initiative will ensure that Alaskans, working cooperatively, are doing all that is possible to understand and respond to the social, economic, and cultural changes resulting from salmon run failures. The AYK SSI is governed by a seven-member Steering Committee (SC) and advised by a six-member Scientific Technical Committee (STC) composed of highly qualified fisheries scientists.

Members of the AYK SSI Steering Committee

(Alternates, if appointed at this time, in parenthesis)

- **Bering Sea Fishermen's Association**
  Dr. John White- Chairman
- **Alaska Department of Fish and Game**
  Gene Sandone
  Jim Magdanz
- **Association of Village Council Presidents**
  Allen Joseph
- **US Fish & Wildlife Service**
  Rod Simmons
- **Kawerak Incorporated**
  William Johnson (Simon Bekoalak, Jr.)
- **National Marine Fisheries Service**
  Bill Hines (Dr. Jack Helle)
- **Tanana Chiefs Conference**
  George Yaska

Members of the AYK SSI Scientific Technical Committee

- Dr. Christian E. Zimmerman, Chair, U.S. Geological Survey- AK Biological Science Center
- Dr. Phil Mundy, Vice Chair
- Ms. Linda Brannian, ADFG- Commercial Fisheries Division
- Ms. Marianne, See, ADFG- Subsistence Division
- Dr. Gordon Kruse, University of Alaska/Fairbanks- Juneau Center
- Dr. Chuck Krueger, Great Lakes Fisheries Commission / Michigan State University

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INTEGRATED AYK SCIENTIFIC COMMITTEE / NRC APPROACH TO RESEARCH PLANNING.

The AYK Steering Committee is currently considering an integrated STC/NRC approach to research planning. The aim of this approach is to develop a scientifically sound, comprehensive, long-range AYK science plan by drawing on the combined resources and expertise of the STC and a specially appointed NRC scientific committee. Under this approach, the AYK Research and Restoration Plan would be developed by the STC, but with NRC involvement in two important ways: 1) an initial NRC report with identification and analysis of broad research themes which precedes plan development, and 2) a review of the draft AYK Research and Restoration Plan as developed by the STC. This process is described in the table below.

STC Tasks	NRC Tasks
PHASE 1: Assess the Current State of Knowledge • **Organize Research Planning Workshop.** In cooperation with NRC staff, and institutional partners such as Sea Grant, UAF School of Oceans and Fisheries, the STC will organize a workshop of 50-60 participants. Presentations will be made on aspects of the salmon life cycle in the AYK region and Bering Sea, describing on-going ecological and socio-cultural research in the region and existing data bases, reviewing progress on previous research plans, and identifying research questions of greatest concern to participants. **(6-8 months)**	• **Establish Study Committee.** The NRC will appoint a study committee of approximately 12 experts from Alaska, other areas of the nation, and other high-latitude countries. The committee will include individuals with expertise in such fields as fisheries biology, biometrics, fisheries oceanography, ecosystem science, and resource management. **(3-4 months)** • **NRC Staff and Committee assists with workshop planning.** • **NRC holds committee meeting / attends AYK Research Planning Workshop.**
• **Collaborate with NRC Committee** STC collaborates with the NRC Committee in accessing and compiling data, facilitating site visits, assessing current state of knowledge, and identifying broad research themes. **(4 months)**	• **Identify broad research themes.** Based on the workshop and consultation with the STC and other organizations, the NRC committee assesses information presented and identifies and describes broad research themes in the AYK.
	• **Prepare an interim report.** The NRC committee prepares an interim report, drawing on insights gained from similar science plans to help avoid known difficulties and pitfalls. Interim report would: Outline essential components of a successful, long-term science plan; Summarize existing research plans such as the NPRB plan relevant to the AYK; Refine research themes around which the science plan can be organized; and Identify critical research questions that should be addressed within research themes and outlines the components of a successful long-term science plan **(8 months)**

STC Tasks (cont'd.)	NRC Tasks (cont'd.)
<u>PHASE II: Development of AYK Science Plan</u> • **Development of a draft AYK Research and Restoration Plan.** Based on the Workshop, guidance from the NRC Interim report, and the contents of existing sub-regional research plans, the STC prepares a comprehensive, long range science plan **(6 months)**	
• **Circulate draft AYK plan** to agencies / stakeholders for comment.	• **NRC Final Report.** The NRC committee will provide a final report that reviews the draft STC AYK science plan, evaluates the plan in light of research themes and questions previously identified in the development process, and assesses the ability of the plan to provide to provide short and long range guidance to research and assessment programs. **(6 months)**
<u>PHASE III: Finalize AYK Plan and Communicate Results</u> • **Revise the draft plan** based on agency and stakeholder comments, external peer review, and the NRC final report. (2 months) • **Broadly communicate results** of planning process to agencies and stakeholders.	

INTEREST GROUP SUMMARY SHEET

Nominee	Aquaculture /mariculture	Commercial Fishing	Commercial Tourism	Conservation/ Environmental	Local Government	Marine Trans-portation	Native Land-owners	Public at Large	Recreation Users	Regional Monitor-ing	Science/ Technical	Sport Hunting and Fishing	Subsistence	Tribal Govern-ment	TC Selection
Torie Baker, Cordova		O						X							
Chris Blackburn, Kodiak								O		X					
*Ron Clarke, Juneau						X		X							
*John Devens, Valdez								X		X					
Gary Fandrei, Kenai	X	X		X				O		X	X				
*John Gester, Anchorage	X							X		X	X				
Brett Huber, Soldotna								X				O			
*Charlie Hughey, Valdez	X	X		X		X		X		X	X	X	X	X	
*Robert Kopchak, Cordova		X						X							
*Pat Lavin, Anchorage				X				X							
Charles Meacham, Juneau		X						X			O				
*Andrew Todd McLaughlin, Chenega Bay	X	X	X	X			X	X	X			X	X		
*Brenda Norcross, Fairbanks											X				
Pat Norman, Port Graham							O	X					X	X	
*Ed Page, Juneau						X		X							
*Martin Robards, Anchorage				X				X							
Gerald Sanger, Whittier			O					X							
Stan Senner, Anchorage				O				X			X				
* Scott Smiley, Kodiak								X							
Stacy Studebaker, Kodiak				X				X	O						
*Mike Vigil, Chenega Bay							X	X					X	X	
*Alex Viteri, Jr., Juneau				X				X							
*Elizabeth Whealy, Sitka			X	X				X			X				
*Clayton White, Utah								X			X				
*Kate Williams, Cordova								X			X		X	X	
Ed Zeine, Cordova					O			X							

* = New applicant O = Represented this position during last PAG term X = Potential to represent this position

STAC subcommittee
process/appointments

Exxon Valdez Oil Spill Trustee Council

441 W. 5th Ave., Suite 500 • Anchorage, Alaska 99501-2340 • 907/278-8012 • fax 907/276-7178

MEMORANDUM

TO: Trustee Council

FROM: Molly McCammon
Executive Director

DATE: October 22, 2002

RE: STAC subcommittee appointments

Enclosed you will find a memorandum from the Scientific and Technical Advisory Committee regarding the STAC's recommendations for subcommittee appointments. I have been able to talk to several of you individually about this. In general, there appears to be support for using three subcommittees at this time: lingering oil injury, data and information management, and a single GEM habitat subcommittee.

A few questions were raised in particular about the GEM habitat subcommittee recommendations, including:

- Why a watershed expert from Alaska was not recommended instead of someone from Arkansas and
- The lack of an actual resource manager on the subcommittee.

These are issues you may want to discuss further at your October 29 meeting. In addition, the original subcommittee process called for appointments to three-year terms. However, given that we are in a very transitional stage with the program, you may want to consider making these appointments for one year only, and revisiting the subcommittee makeup next year.

Regarding the data management subcommittee, the Trustee Council's data systems director, Bob Walker, has decided to return to the Alaska Department of Fish and Game. Bob would make an outstanding contribution on the data committee, and I recommend that his name be included on that list.

If you have any questions about any of the recommendations, please don't hesitate to contact me.

September 30, 2002

To: Molly McCammon, Executive Director

From: Brenda Norcross, STAC co-chair
Phil Mundy, STAC co-chair

Cc: Steve Braund, STAC
Charles Miller, STAC
Ron O'Dor, STAC
Bill Seitz, STAC
Warren Wooster, STAC
Katharine Miller, Science Coordinator

Re: Nominations of STAC for GEM subcommittees: Habitat-type, Data Management and Information Transfer, and Lingering Oil Effects

Habitat-type Subcommittee Nominations

The Scientific and Technical Advisory Committee (STAC) met via conference call on Monday, September 23, 2002 to develop the first group of nominations for the GEM habitat-type subcommittees. **The STAC recommends that the initial program needs are best met by a group of twelve habitat-type subcommittee members with broad experience in the habitat types, GEM strategies, and essential scientific specialties** (see attachment). Under the process approved by the Trustee Council, the STAC was authorized to nominate 20 to 32 people to fill seats on four habitat-type subcommittees; watersheds, nearshore, Alaska Coastal Current (ACC), and offshore. After discussing the immediate needs of the STAC and GEM program for assistance from the subcommittees at its May and August meetings, and after consultation with Council staff, the STAC elected not to nominate the full complement of subcommittee members at this time.

The STAC recommendation was based on the strategy of selecting members with multidisciplinary backgrounds whose diverse experience would serve multiple purposes in the development of the GEM program. Therefore, the nominees are not only experts in specific scientific disciplines, habitat areas and taxonomic fields, but also have experience and positions that emphasize the integrated ecosystem approach required to make GEM successful. STAC also considered that a single committee with 12 members would be more productive than a larger committee, the need for efficiency of operations for the GEM program at this stage of its development, and the expected magnitude of subcommittee costs relative to program size. Furthermore, the STAC heeded the NRC advice to build the subcommittee structure in stages over time, in response to demonstrated program needs;

> Subcommittees should be established, however, only after identification of a need. If such subcommittees are arbitrarily established they can be divisive and a hindrance to successful advancement of program goals. (NRC 2002, p. 57)

Additionally, when selecting the members of the habitat-type subcommittees, the STAC avoided duplicating areas of expertise presently represented by members of STAC, as another means of promoting efficiency.

The STAC further recommends that the interested persons who were not selected be asked to serve as a committee of peer reviewers, advising the STAC during development of the GEM Science Plan over the next three years. The substantial body of talent and interest in the GEM program represented by the applicants for subcommittees should be used to best advantage. Designating a formal peer-review committee would serve a number of purposes, including peer review of the Science Plan, and developing a pool of informed scientists and community members from which Work Group members, workshop participants and future subcommittee nominees could be drawn. The Science Plan Peer Review Committee (SRC) would receive the same information and have the same opportunity to comment as the subcommittee members, however travel support would not be provided. It is anticipated that SRC members would receive travel support when serving as members of Work Groups. Workshop participants may also receive travel support, depending on needs and circumstances.

Data Management and Information Transfer and Lingering Oil Subcommittees
Nominees for the Data Management and Information Transfer and Lingering Oil subcommittees were developed in separate processes managed by Bob Walker and Bob Spies, respectively, at the request of the STAC. Lists of nominees and qualifications are attached.

Attachment

ATTACHMENT

Habitat-type Subcommittee Nominations

- Vernon Byrd: Birds, Management, Mammals, Nearshore, ACC
- Robyn Hannigan: Geophysical processes, Fish, Watersheds, Nearshore, Ecosystems
- Mimi Hogan: Community Involvement, Watersheds, Birds, Fish, Mammals, Management
- Henry Huntington: Community Involvement, Watersheds, Nearshore
- Eric Knudsen: Management, Fish, Watersheds
- Lyman McDonald: Statistics, Nearshore
- Bern Megrey: Modeling, Fish, ACC, Offshore, Ecosystems
- Jennifer Nielsen: Fish, ACC, Offshore
- Susan Saupe: Chemical oceanography, Nearshore, Fish
- Tom Weingartner: Physical oceanography, ACC, Offshore, Modeling
- Doug Woodby: Invertebrates, Fish, Management, Statistics, Ecosystems, Nearshore
- Kate Wynne: Mammals, Ecosystems, Management, Nearshore, ACC

The group of 12 nominees represents experience in the four habitat types, and a broad spectrum of expertise in scientific specialties, community involvement and management applications. The categories of expertise were chosen based on those represented by the GEM Program Document's Chapter 7 - Scientific Background, and by the implementation strategies of GEM Chapter 3. Number of members with experience in the GEM habitat-types among nominees is seven nearshore, four watershed, six ACC, and three offshore, with eight members having experience relevant to multiple habitat-types. In addition to the breadth and depth of expertise represented , the nominees are affiliated with a cross-section of institutions, state, federal and tribal governments, and the non-governmental, academic, and private sectors (See Table following).

Table of Habitat-type Subcommittee Nominees by Affiliation, Habitat, and Expertise

Name	Affiliation	Habitat Type				Expertise									
		Watershed	Nearshore	ACC	Offshore	Ecosystem	Community	Fish	Inverts	Management	Mammals	Modeling	Physical	Birds	Statistics
Byrd, Vernon	USF&WS		X	X						X	X			P	
Hannigan, Robyn	U Arkansas	X	X			X		X					P		
Hogan, Mimi	CRRC	X					P	X		X	X			X	
Huntington, Henry	Consultant	X	X				P								
Knudsen, Eric	USGS/ASC	L						X		P					
McDonald, Lyman	Consultant		X												P
Megrey, Bern	NMFS/AFSC			X	X	X		X				P			
Nielson, Jennifer	USGS/ASC			X	X			P							
Saupe, Susan	CIRCAC		L					X					P		
Weingartner, Tom	UAF/IMS			L	L							X	P		
Woodby, Doug	ADF&G		X	X		X		X	P	X					X
Wynne, Kate	UAF/FITC		X	X		X				X	P				

P = primary expertise, X = other experience, L = habitat lead

Vernon Byrd is a federal scientist and recognized authority and author on birds of nearshore environments who has worked in the management of natural resources in Alaska for over two decades. He has served as a biological technician, refuge manager and refuge biologist on five different national wildlife refuges. Mr. Byrd has worked primarily with seabirds, marine mammals, waterfowl, and endangered and threatened species, and has served on four endangered species recovery teams. He is currently a member of the Steller Sea Lion and Aleutian Canada goose teams. Mr. Byrd has a masters degree in wildlife biology from the University of Idaho.

Robyn Hannigan is an academic biologist and physical scientist whose work provides a national perspective on the cross-habitat connections between watersheds and the nearshore marine environments. She has a background in chemistry, geology, biogeochemistry, and fisheries and has worked in identifying essential fish habitat by analyzing chemical signatures found in otoliths. Dr. Hannigan has a Ph.D. in geochemistry from the University of Rochester.

Mimi Hogan is the Tribal Natural Resource Planner for the Chugach Regional Resources Commission who is assisting the tribes in developing natural resource management plans. Ms. Hogan has also worked for the US Fish and Wildlife Service in Alaska on a variety of terrestrial and marine resource programs. She has a long work experience in Alaska, and helped to develop the first subsistence management plan for migratory waterfowl in the State. Ms. Hogan has a masters degree in Wildlife Biology from the University of Missouri, Columbia

Henry Huntington is a private social scientist who is internationally recognized for his work in Alaska and other northern areas on the utilization of natural resources by indigenous peoples. He has served as the Environmental Coordinator for the Inuit Circumpolar Conference (ICC), coordinating ICC policy regarding the Arctic Environmental Protection Strategy (AEPS), in cooperation with indigenous organizations in Russia and Scandinavia. He was also responsible for traditional ecological knowledge and other research projects under the auspices of the AEPS. Dr. Huntington has a Ph.D. in polar studies from the University of Cambridge (U.K.), Scott Polar Research Institute.

Eric Knudsen is a federal biologist working on Alaskan salmon and freshwater management problems who is nationally recognized for his work in Alaska and the Pacific Northwest. He has conducted research in salmon stock assessment methods, the effectiveness of marine reserves on fisheries populations and biological colonization of streams recently uncovered during glacial recession in Glacier Bay, Alaska. Dr. Knudsen has a Ph.D. in Wildlife and Fisheries Science from Louisiana State University, Baton Rouge

Lyman McDonald is a private biometrician/statistician with thirty years of comprehensive experience in the application of statistical methods to design, conduct, and analyze environmental and laboratory studies. His specialties include sampling of biological communities, calibration of biased sampling procedures, jackknifing and bootstrapping procedures, capture-recapture and tag-recovery statistics, general linear models, and multivariate analysis. Mr. McDonald has significant experience in working with biologists to understand the plants and animals of nearshore environments of Alaska, the Pacific Northwest, and other areas. Dr. McDonald has a Ph.D. in Statistics from Colorado State University.

Bern Megrey is a federal modeler and quantitative biologist who is internationally known for his work on interdisciplinary models describing productivity of the North Pacific. He is presently lead investigator for recruitment modeling studies for Fisheries-Oceanography Coordinated Investigations (FOCI), he has over 15 years experience studying the dynamics of exploited North Pacific fish populations, the relationships of the biophysical environment to recruitment variability, and the application of modeling and quantitative techniques to fisheries research and natural resource management. Dr. Megrey has a Ph.D. in Fisheries Science from the University of Washington, Seattle.

Jennifer Nielsen is a federal biologist based in Alaska who is internationally recognized as an author and editor of a large volume of work on salmonids. In addition she is well known for work on molecular genetics, stock identification, conservation and management of Pacific salmonids; evolution and biogeography in fishes; marine and freshwater fish behavior and habitat use; and impacts of sport and recreational fishing on resource management. Dr. Nielsen has a Ph.D. in Environmental Science, Policy and Management from the University of California, Berkeley.

Susan Saupe is an NGO scientist who is a leader in establishing programs in southcentral Alaska to monitor the effects human activities on the nearshore environments. She has experience in shore zone mapping, intertidal reconnaissance, and the evaluating the effects of contaminants on nearshore areas. Ms. Saupe has a masters degree in chemical oceanography from the University of Alaska, Fairbanks.

Tom Weingartner is an academic physical scientist who is nationally recognized for his work on measuring and explaining movements of water masses in the Alaska Coastal Current. His specialty is physical oceanography of the Arctic Ocean and its adjacent shelves and physical oceanographic effects on marine ecosystems. He is involved in numerous projects involving research cruises and the use of moored instruments to measure ocean velocity, temperature, and salinity periodically (usually hourly) for up to a year or more at specific locations in the water column. Dr. Weingartner has a Ph.D. in physical oceanography from North Carolina State University.

Doug Woodby is a state biologist with experience in marine ecology, invertebrates, fish and marine birds who is a leader among scientists in the state of Alaska in developing scientific information with application to management. His work in Alaska includes stock assessment, population biology, and population modeling research on shellfish and groundfish in the eastern Gulf of Alaska; research on invertebrate species such as sea cucumbers, sea urchins, geoducks, and abalone; and supervision of research on herring, sablefish, rockfish, and lingcod. He has experience as a Biometrician, Fisheries Biologist, and Fisheries Scientist. Dr. Woodby has a Ph.D. in Population Biology from the University of California, Santa Barbara.

Kate Wynne is an academic biologist who is one of the leading scientists now working in Alaska on population assessment and field ecology of marine mammals. Ms. Wynne's work includes designing and conducting projects to research and/or to mitigate marine mammal-human interactions, and interpreting marine mammal policy and regulations to assist marine resource users and the public. In 1993 she published with Alaska Sea Grant the national award-winning book, Guide to Marine Mammals of Alaska. Ms. Wynne has a masters in wildlife management from the University of Idaho, Moscow

Data Management and Information Transfer Subcommittee Nominations

- Rob Cermak:
- Carol Fries:
- Jay Johnson:
- Russell Kunibe:
- Mark Shasby:
- Hank Statscewich:

The group of 6 nominees provides a broad spectrum of technical knowledge, and experience in several data areas relevant to the GEM program. The nominees are affiliated with a cross-section of state and federal agencies, and the University of Alaska

Name	Affiliation	Expertise											Data Areas					
		Data analysis	Database management systems	Data visualization	Electronic data exchange	Geographic information systems	Information systems planning and operations	Metadata	Modeling	Programming	Remote sensing	Web-based information systems	Ecological information	Environmental information	Land management information	Marine biology information	Meteorology	Oceanographic information
Rob Cermak	SFOS, UAF/Fairbanks	X	X	X				X	X	X	X	X					X	X
Carol Fries	ADNR/Anchorage		X		X	X	X					X		X	X			
Jay Johnson	USFWS/Anchorage		X			X	X			X	X		X		X			
Russell Kunibe	ADEC/Juneau		X		X	X	X	X		X		X		X				
Mark Shasby	USGS/Anchorage					X	X	X			X		X		X			
Hank Statscewich	IMS, UAF/Fairbanks	X		X					X		X	X		X		X		X

Rob Cermak is skilled in database management, data archiving and modeling in coastal observing and meteorological applications. He is a systems and software engineer with the School of Fisheries and Ocean Sciences, University of Alaska Fairbanks, and has primary responsibility for the Institute of Marine Science's data archive. Rob has a M.S. in Meteorology from Rutgers University.

Carol Fries has been manager of several information technology projects focused on the Exxon Valdez Oil Spill, and the transfer of information to a variety of user groups utilizing database, GIS, and web technologies. She is a Natural Resource Manager with the Alaska Department of Natural Resources in Anchorage and chairs ADNR's Webmaster and GIS Coordinating Committees. Carol has a M.S. in Environmental Education from Indiana University.

Jay Johnson has a decade of experience in developing and managing geographic information systems. He is a GIS specialist with the US Fish and Wildlife Service in Anchorage and is involved in regional GIS planning, database development and management, and coordination with other agencies. Jay has a M.S. in Physics from Washington University, and is working on his PH.D. in Forestry/Remote Sensing.

Russell Kunibe is known for his development of environmental and management information systems. He is an analyst/programmer with the Alaska Department of Environmental Conservation in Juneau and currently is charged with developing ADEC's EPA STORET database as a repository for statewide environmental monitoring data, the development of data exchange mechanisms with EPA's nationwide network, and development of an information management system to support Alaska's Clean Waters Actions. Russell has a M.S. in Physiology from the University of California at Davis.

Mark Shasby is well known for his work on geographic information systems, remote sensing and development and use of metadata standards. He is Chief of the Alaska Geographic Science Office of USGS, and manages all research and production activities of the Geographic Division of USGS in Alaska. He has served on several interagency geographic data and standards committees. Mark has a M.S. in Forest Ecology from Duke University.

Hank Statscewich is known for his work overseeing research associated with the SALMON (Sea-Air-Land Modeling and Observing Network) project, a program that fosters the implementation and operation of ocean-observing systems in Alaskan coastal waters. He is a research analyst with the Institute of Marine Science, University of Alaska Fairbanks. His most recent research activities focused on the collection, analysis, visualization and interpretation of remote sensing and in situ data sets for use in constructing and validating oceanographic models. Hank has a M.S. in Oceanography from Rutgers University.

Lingering Oil Effects Subcommittee Nominations

- James Bodkin
- Walter Cox
- Judy McDowell
- Allan Mearns
- Stan "Jeep" Rice
- Jeff Short

Dr. James Bodkin-Jim is a senior biologist with the USGS's Alaska Science Center. He has worked on sea otter population dynamics in Prince William Sound, The Aleutian Islands and California.

Mr. Walter Cox is an oceanographer with the Prince William Sound Science Center. He has helped administer the Oil Spill Research Institute in Cordova. His local experience and knowledge of OSRI programs would be very helpful.

Dr. Judy McDowell-Judy is professor at Woods Hole Oceanographic Institution in Woods Hole Massachusetts. She has conducted research and literature reviews on marine pollution issue for over 30 years. She has been a member of many NRC committees addressing marine issues, including the latest committee that revised "Oil in the Sea".

Dr. Allan Mearns-Alan is a senior biologist with NOAA's Hazardous Materials Division. He has on-the-ground experience evaluating damage and recovery in numerous oil spills around the United States and the world. He has worked on the NOAA intertidal studies in Prince William Sound for over 10 years.

Dr. Stan "Jeep" Rice – Dr. Rice is a senior biologist with NOAA's Auke Bay laboratory. He has worked since the earliest days of the spill to evaluate its effects. He has numerous publications on oil toxicity and over 30 year's experience in this area.

Mr. Jeff Short – Mr. Short has been the principal hydrocarbon chemist for Trustee Council studies for over 10 years. He is responsible for maintaining the Trustee Council hydrocarbon database and I have relied on his judgment in evaluating reports and publications with chemical data in them. Jeff has many publications on oil chemistry and other aspects of oil pollution.

Subcom.

GEM Subcommittee Nominations

NAME	GEM HABITAT AREA	INTEREST/EXPERTISE	AFFILIATION	Hard Copy?
Blanchard, Arny	Nearshore/Statistics	benthic ecology, marine biology	U. Alaska Fairbanks	
Blanchette, Carol Anne	Nearshore	population and community ecology, marine ecology	UC Santa Barbara	
Bodkin, James	Nearshore	resource management (coastal systems)	USGS,Alaska Science Center	
Brown, Evelyn	Nearshore	ecological processes, fisheries oceanography		
Byrd, George Vernon	Nearshore/Offshore/ACC?	seabirds, marine mammals, E&T species	Alaska Maritime Wildlife Refuge	
Castellini, Michael Angelo	ACC/Offshore?	marine mammals, physiology	UC San Diego	
Clark, Robert	Nearshore/Watershed	fisheries, resource management modeling	Alaska Department Fish and Game	
Colt, Stephen	All	Economics, human activities	U. Alaska Anchorage	
Cooper, Joel	Nearshore	water quality, community monitoring programs	Cook Inlet Keeper (non-profit)	
Davis, Randall William	Nearshore/Offshore/ACC?	maine mammals, physiology	Texas A&M	
Dean, Thomas	Nearshore	invertebrates, ecological impacts	Consultant	
Frenzel, Steven	Nearshore/Watershed	hydrology	USGS,Alaska Science Center	
Goldstein, Michael	Watershed	wildlife/fisheries ecology, ecotoxicology	USFS, Chugach National Forest	
Hagan, Peter	Nearshore/ACC	fisheries	NOAA	
Hannigan, Robin	Nearshore	chemical-geological oceanography, contaminants, fisheries ecology	Arkansas State University	
Hatch, Scott	Nearshore/Offshore/ACC?	population ecology, seabirds	USGS,Alaska Science Center	
Hauser, William	Watershed	resource management, human activities, fisheries	Alaska Department Fish and Game	
Hedstrom, Kate	Offshore/ACC	modelling, computing	U. Alaska Fairbanks	
Hermann, Albert	Offshore/ACC?	oceanography	U. Washington	
Hetrick, Jeff	Nearshore	Human activities, community-based programs	Chugach Regional Resources Commission (Native Corporation)	Y
Hillgruber, Nicola	Offshore/ACC	early life history marine fishes, feeding ecology	U. Alaska Fairbanks (Juneau)	
Hogan Mary (Mimi)	Nearshore/Watershed	community involvement, natural resource management	Chugach Regional Resources Commission (Native Corporation)	
Huntington, Henry	Nearshore/Watershed	traditional ecological knowledge, human activities	Consultant	
Irvine, Gail	Nearshore	marine biology/ecology, contaminants	National Park Service	
Kline, Thomas	Watershed/Offshore/ACC	stable isotope, salmon ecology	Prince William Sound Science Center	Y
Knudsen, Eric	Nearshore/Watershed	salmon ecology	USGS,Alaska Science Center	Y
McCollum, Paul	Nearshore/Watershed	traditional ecological knowledge, resource management	Chugach Regional Resources Commission (Native Corporation)	
McDonald, Lyman	Nearshore/Watershed	statistics	Consultant	
Moles, Adam	Nearshore	fisheries, environmental effects	NMFS Auke Bay Lab	
Musgrave, David	Offshore/ACC	oceanography	U. Alaska Fairbanks	
Nielsen, Jennifer Lee	Nearshore/Watershed	salmon/trout ecology	USGS,Alaska Science Center	

GEM Subcommittee Nominations

NAME	GEM HABITAT AREA	INTEREST/EXPERTISE	AFFILIATION	Hard Copy?
Norman, Patrick	Nearshore/Watershed	traditional ecological knowledge, community programs	Village of Port Graham	Y
Rea, Lorrie	Offshore/ACC?	marine mammals	Alaska Department Fish and Game	
Reggiani, David	Nearshore/Watershed	salmon aquaculture, fisheries management	Prince William Sound Aquaculture Corporation	Y
Rosenberg, Daniel	ALL?	seabirds, traditional resources	Alaska Department Fish and Game	
Roseneau, David	Nearshore/ACC?	seabirds, food webs, forage fish, community based science	USFWS	
Saupe, Susan	Nearshore/Watershed	environmental monitoring, community monitoring programs,	Cook Inlet Regional Citizens Advisory Council (CIRCAC)	
Schoch, Carl	Nearshore	biological oceanography, PISCO	Kachemak Bay Research Reserve	
Small, Bob	Offshore/ACC	marine mammals	ADF&G	
Sperbeck, David	Nearshore	human activities, statistics	Private (no affiliation)	Y
Statscewich, Hank	Offshore	remote sensing, modelling	U. Alaska Fairbanks	
Vaughn, Shari	Offshore/ACC	oceanography, physics	Prince William Sound Science Center	
Volstad, Sabrina	Nearshore	environmental education, water monitoring	Seldovia Tribe	
Walker, Coowe	Nearshore/Watershed	wetland, nutrients	Kachemak Bay Research Reserve	Y
Weingartner, Thomas	Offshore/ACC	oceanography	U. Alaska Fairbanks	
Willette, T. Mark	Watershed/Nearshore	salmon biology	ADF&G	
Woodby, Doug	Nearshore/Watershed	fisheries, ecosystem ecology, feeding ecology	Alaska Department Fish and Game	Y
Wynne, Kate	Nearshore/ACC?	marine mammals, policy and regulation	U. Alaska Fairbanks	

Gulf of Alaska Ecosystem Monitoring and Research Program

Process for Providing Scientific and Technical Advice and Peer Review
Adopted by Trustee Council
February 25, 2002

Addendum to Program Management
(GEM Program Document, Volume I, Chapter 6)
(References to Volume numbers and chapters refer to the August 2001 Draft of the GEM Program Document, available on http://www.oilspill.state.ak.us/index.html)

I. DESCRIPTION OF PROCESS FOR SCIENTIFIC ADVICE

The GEM Program is a long-term monitoring and research program, responsive to the needs of resource management agencies, stakeholders and the public, consistent with the program's mission and goals, and held to a high standard of scientific excellence. The process for providing scientific and technical advice includes 1) advice on the program as a whole; 2) advice at the individual project level; and 3) peer review of all proposals and reports.

The GEM scientific advice process builds upon the Trustee Council's successful record of 13 years of peer-reviewed science. This process will be implemented by staff to the *Exxon Valdez* Oil Spill Trustee Council; a committee structure consisting of a Scientific and Technical Advisory Committee (STAC) and related subcommittees and work groups; and a periodically convened independent review committee (see Figure 6.1 below). Programmatic and technical review largely will be separated. This process will be reviewed and refined over time, as experience with program implementation permits better understanding of the Trustee Council's needs for scientific advice under GEM.

In addition to scientific advice provided by the proposed STAC and subcommittees, the Trustee Council also relies on advice from the Program Advisory Committee, other members of the public, and trustee agency staff. The Executive Director is expected to take this broad spectrum of advice into account when resolving conflicting issues and developing recommendations for Trustee Council consideration.

A. Staff

Since the Trustee Council receives information and guidance from a number of sources, the Council relies on its Executive Director to ensure that all advice and reviews are organized and summarized to assist the Council's decision-making. The Executive Director reports directly to the Trustee Council and has the ultimate responsibility for implementing all the Trustee Council's programs, policies and procedures.

The Executive Director will be assisted by a Senior Science Advisor for Oil Spill Effects, a Science Director and other staff.

The Senior Science Advisor for Oil Spill Effects will provide advice on direct oil-spill related injury and recovery, including peer review of related project proposals and reports. This position will chair the Oil Effects Subcommittee and report the committee's recommendations to the STAC.

The Science Director will assist the Executive Director by 1) providing scientific leadership for the GEM Program; 2) serving as GEM's primary scientific spokesperson and a non-voting permanent co-chair of the STAC; 3) coordinating the scientific committee structure; and 4) ensuring that the GEM Program is implemented with a high standard of scientific excellence. This role is expected to adapt to the changing needs of the growing GEM program.

B. Committee Structure

Scientific and Technical Advisory Committee (STAC). The STAC is a standing committee that is expected to provide the primary scientific advice to the Executive Director on how well the collection of proposed monitoring and research projects (the Work Plan) and the overall GEM Program meet the mission and goals of the Trustee Council (GEM Program Document Vol. I, Chapter 1) and test the adequacy of the GEM conceptual foundation (see Figure 4.3). As needed and appropriate, the STAC may participate in and/or lead the peer review process of proposals and project reports.

Subcommittees. The subcommittees are standing committees organized to address the "nuts and bolts" of developing and implementing projects responsive to the Council's needs, coordinating among scientists and other interested parties, and helping to organize technical peer review of individual proposals.

Work groups. *Ad hoc* work groups are subcommittees temporarily formed to address specific issues. They have a specific purpose and a limited duration.

C. External Review Committee

Periodically (every five to ten years), the Trustee Council will contract with an external entity, such as the National Research Council, to review the entire GEM Program.

II. ESTABLISHING AND MAINTAINING COMMITTEE STRUCTURE

A. Scientific and Technical Advisory Committee (STAC)

<u>Responsibilities</u>

1. The STAC shall meet as often as needed to provide to the Executive Director broad programmatic advice and guidance on the GEM Work Plan with respect to the GEM Program's mission, goals, conceptual foundation, central hypotheses and questions.
2. The STAC shall recommend to the Executive Director projects for the GEM Work Plan best suited to the mission, goals, conceptual foundation, and central hypothesis. A written record of these recommendations shall be presented to the Program Advisory Committee (PAC) and to the Trustee Council.
3. The STAC co-chairs shall brief the PAC and the Council once a year on the state of the GEM program and on other occasions at the request of the Trustee Council, the Executive Director, or the STAC.
4. The STAC, in conjunction with the subcommittees, shall provide leadership in identifying and developing testable hypotheses relevant to the conceptual foundation and central questions of the GEM Strategic Plan, consistent with the GEM Program's mission and goals and the policies of the Trustee Council.
5. The STAC, using recommendations provided by the subcommittees and other means, shall identify and recommend syntheses, models, process studies, and other research activities for the Invitation to Submit Proposals.
6. The STAC shall meet with subcommittee chairs as needed.
7. The STAC shall select the subcommittee members, following a process approved by the Trustee Council. The STAC shall receive reports and briefings from the subcommittee chairs as needed.
8. The STAC shall assist Trustee Council staff in identifying peer reviewers, and may, upon request, conduct peer review on individual responses to the Invitation for Proposals and project reports.
9. Subject to funding restrictions and in consultation with the Executive Director, the STAC may convene special review panels or work groups to evaluate and make recommendations about aspects of the GEM program, or to meet with project investigators and others to fully explore particular projects or issues.

Membership

1. The STAC shall have seven members: six voting members appointed by the Trustee Council with the advice of the independent nominating committee and the Trustee Council's GEM Science Director as the seventh member who serves as permanent non-voting co-chair.
2. The STAC members shall be drawn from the scientific sectors of academic, government, NGO, and private institutions. Together the members shall possess expertise in the habitats, species and environments of the Alaska Coastal Current and offshore, the intertidal and subtidal (nearshore), the watersheds, modeling, resource management, human activities and their potential ecological impacts, and community-based science programs.
3. The STAC members shall be selected for their expertise, broad perspective, long experience and leadership in areas important to the GEM Program.
4. STAC members cannot be principal investigators for presently funded or ongoing GEM projects.

5. The STAC members shall serve terms of four years, renewable once at the option of the Trustee Council, except during the first two years of the program when three members shall serve initial terms of two years, renewable for a full four year term. All renewals for a second term are at the option of the Trustee Council.
6. After serving on the STAC, a person is not eligible to serve again on the STAC for two years, with the exception of a person who was appointed from the list of alternates to complete a partial term. A person appointed as an alternate is eligible to be nominated to an open membership slot to serve a full term, and may, if serving less than two years and at the discretion of the Trustee Council, also be eligible for renewal.
7. In the event of a vacancy prior to the end of a term, the Trustee Council shall appoint a replacement from among the list of alternates. Inactive members may be removed by the Trustee Council from the STAC membership.

Rules of Procedure

1. The STAC shall elect a co-chair by majority vote at least once every two years. The Science Director shall serve as the other co-chair.
2. Matters that cannot be resolved by consensus shall be decided by four affirmative votes of the STAC membership.
3. The STAC shall develop procedures for interfacing with the subcommittees, work groups and the Program Advisory Committee.

B. Subcommittees

Responsibilities

1. Subcommittees shall provide guidance within each habitat type to the STAC and to the Trustee Council staff regarding testable hypotheses and other topics for consideration in future Invitations to Submit Proposals.
2. Subcommittees shall identify implementation strategies and possible locations for measuring monitoring variables that are relevant to the key questions and testable hypotheses.
3. Subcommittees shall, upon request, help organize the peer review on proposals and project reports in their broad habitat types, including recommending appropriate peer reviewers.
4. Initially, the subcommittees shall be organized along the lines of the four primary habitat types: offshore, Alaska Coastal Current, nearshore and watersheds, with additional subcommittees for oil effects and data management. The subcommittee structure may change following further review and discussion (and pending final NRC review).
5. Subject to funding restrictions, subcommittees may convene special review panels from time to time to evaluate and make recommendations about aspects of the GEM program. At other times, special panels may meet with project investigators and others to fully explore particular topics, problems, or projects.
6. A subcommittee may notify the STAC when it encounters the need for a work group.

Membership

1. Subcommittees are composed of at least 5 and not more than 8 individuals: scientists, resource managers, and/or other experts selected by the STAC primarily for their disciplinary expertise and familiarity with a broad habitat type (watersheds, intertidal and subtidal, ACC, or offshore). Other criteria include institutional and professional affiliations in order to promote collaboration and cooperation.
2. Subcommittee members serve three year renewable terms.
3. Subcommittee members may include principal investigators of GEM projects.
4. Nominees who agreed to serve, but were not selected by the STAC, may serve as peer reviewers and recommend peer reviewers, and are automatically considered as nominees to fill vacancies on subcommittees.

Rules of Procedure

1. Subcommittees shall elect their own chairs, usually in a person's third year on the committee.
2. Matters that cannot be resolved by consensus shall be decided by majority vote of the membership.

C. Work Groups

Responsibilities

1. Work Groups shall recommend to the STAC or a subcommittee courses of action on the task for which the work group has been established. Tasks may include developing strategies to implement specific monitoring and research goals.
2. Work Groups may help organize the peer review on proposals submitted to address the task for which the work group has been established.

Membership

1. Any number of individuals may be appointed to work groups established by the Executive Director at the request of the STAC. Expertise will depend on the issue to be addressed.
2. Members are approved by the Executive Director from nominees submitted by the STAC or subcommittee that identified the need for the work group.
3. Work groups are expected to be issue specific and of a limited duration specified by the Executive Director at its inception.

Rules of Procedure

1. Work groups shall elect a chair by majority vote.

2. Matters that cannot be resolved by consensus shall be decided by majority vote of the membership.

III. SELECTING COMMITTEE MEMBERS

A. Selection Process for STAC

1. The Executive Director shall issue a public call for nominations to serve on the STAC. The call will identify the types of expertise and the qualifications the Trustee Council desires to see for the nominees. Any person (including oneself) or organization is free to make a nomination.
2. Those nominating a person – or the person being nominated -- will be asked to submit a one-page synopsis of the nominee's qualifications to the Executive Director.
3. At the request of the Executive Director, a Nominating Committee will convene to develop a recommended list of persons fitting STAC membership criteria. The Nominating Committee shall recommend to the Executive Director a nominee for each vacant seat on the STAC, after determining that each is willing to serve on the STAC. Remaining nominees who are willing to serve may become alternates. The list of nominees and alternates shall be forwarded to the Trustee Council by the Executive Director.
4. The Nominating Committee may suggest names of persons not nominated if there are gaps in desired expertise among the nominees provided to it by the process (i.e., nominating committee members may also make their own nominations).

STAC Nominating Committee

Responsibilities

1. The STAC Nominating Committee shall review nominations for the STAC; if necessary, it may solicit additional nominations at its discretion.
2. The nominating committee shall provide the Executive Director a list of preferred and alternate nominees for appointment to the STAC.
3. The Nominating Committee chair shall brief the Trustee Council on its recommendations.

Membership

1. The STAC Nominating Committee shall be composed of seven members who are familiar with the development and operation of regional monitoring programs similar to GEM.
2. Nominating Committee members may not currently be receiving funding from the Trustee Council, nor may they be closely associated with, or dependent on, those who are funded by the Trustee Council. For example, the Nominating Committee members may not be funded investigators within the EVOS/GEM program, nor may nominating committee members be the immediate supervisors or supervisees of currently funded investigators, or members of their immediate family.

3. At least five Nominating Committee members shall reside in Alaska. STAC nominees and current STAC members may not serve on the Nominating Committee.
4. Nominating Committee members shall be selected by the Executive Director in consultation with the Trustee Council. The Executive Director shall also determine the life of the Nominating Committee.

Rules of procedure

1. The Nominating Committee shall elect a chairperson by majority vote to conduct the meetings.
2. The Nominating Committee shall establish a schedule and a process for developing a recommended list of nominees for the STAC that is consistent with applicable state and federal statutes, particularly with regard to Equal Employment Opportunity principles and diversity considerations.
3. The Executive Director shall provide assistance as requested by the Nominating Committee chair.

B. Selection Process for Subcommittee Members

1. The Executive Director shall issue public calls for nominations to the subcommittees. The announcements shall list desirable qualifications and other nominating criteria.
2. The STAC shall review the nominees and make recommendations to the Trustee Council for approval.

C. Selection Process for Work Group Members

1. The Executive Director shall approve work group members upon the recommendation of the STAC and/or subcommittees.

IV. PEER REVIEW

Each project proposal, as well as some annual and all final reports, will be peer-reviewed by appropriate experts who are not competing for funding from the GEM program in the same competition and, in general, also are not conducting projects funded by the Trustee Council. The external peer review process will provide a rigorous critique of the scientific merits of proposals and reports. The goals of the review process are to ensure that studies sponsored by the Trustee Council 1) adhere to a high standard of scientific excellence; 2) have scientific objectives that are relevant and consistent with the GEM Program's conceptual foundation, central questions, and testable hypotheses; and 3) use valid methods that will allow them to achieve these objectives. The peer review may be either paid or volunteer, or some combination, whichever is most expeditious and appropriate. Reviews and recommendations shall be documented in writing.

The STAC or subcommittees may convene work groups from time to time to evaluate and make recommendations about aspects of the GEM program. These may include

special peer review panels that would meet with project investigators and others to fully explore particular topics, problems, or projects.

A framework for peer review shall be developed by Trustee Council staff and include the following:

- A clear statement of the purposes of the peer review
- The role of the peer reviewer
- Guidelines for achieving and maintaining impartiality

The Science Director is responsible to the Executive Director and the Trustee Council for maintaining independence and the appropriate level of expertise for each peer review activity, training of peer reviewers in established procedures, and establishing an honorarium (payment) process for peer reviewers when necessary to accomplish the needed peer review.

Figures follow on two pages

Figure 4.3 Selecting monitoring elements starts with the mission and goals established by the Trustee Council, as expressed in the conceptual foundation, which is regularly updated by new information from a variety of sources. GEM Program Document, Vol. I, Chapter 4, page 38.

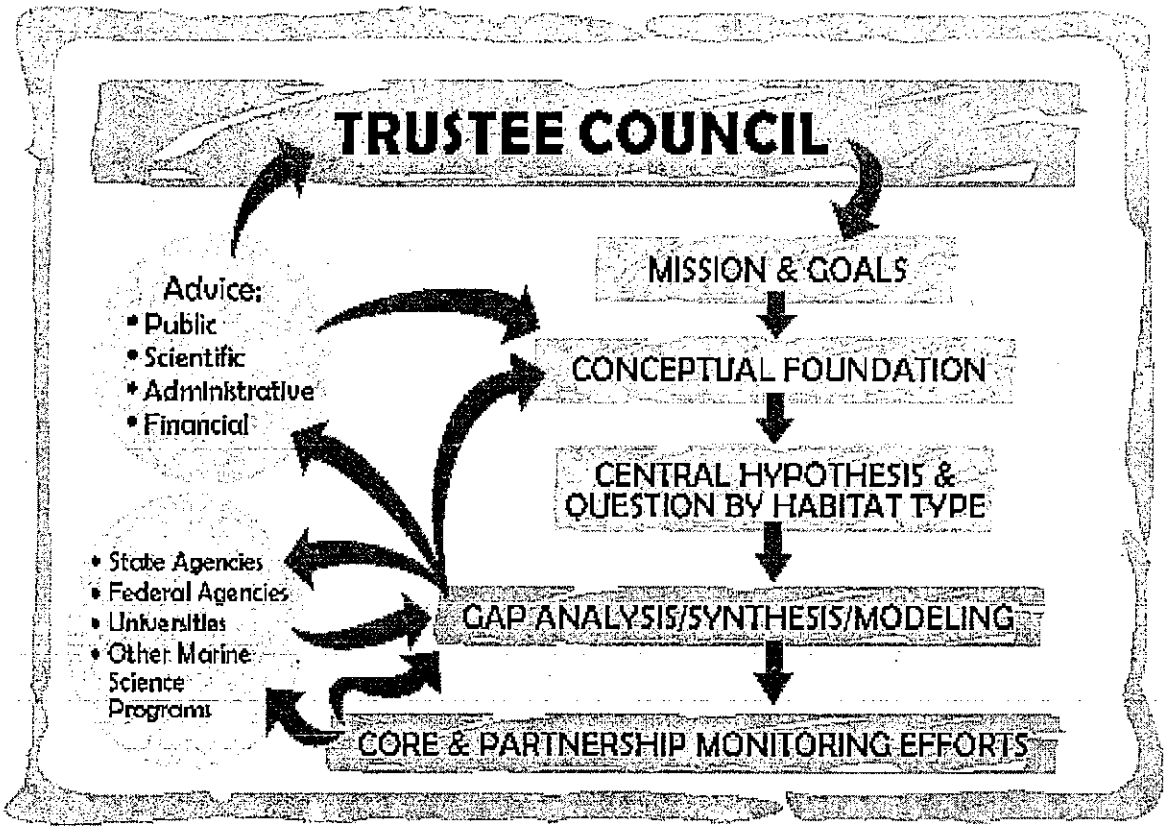
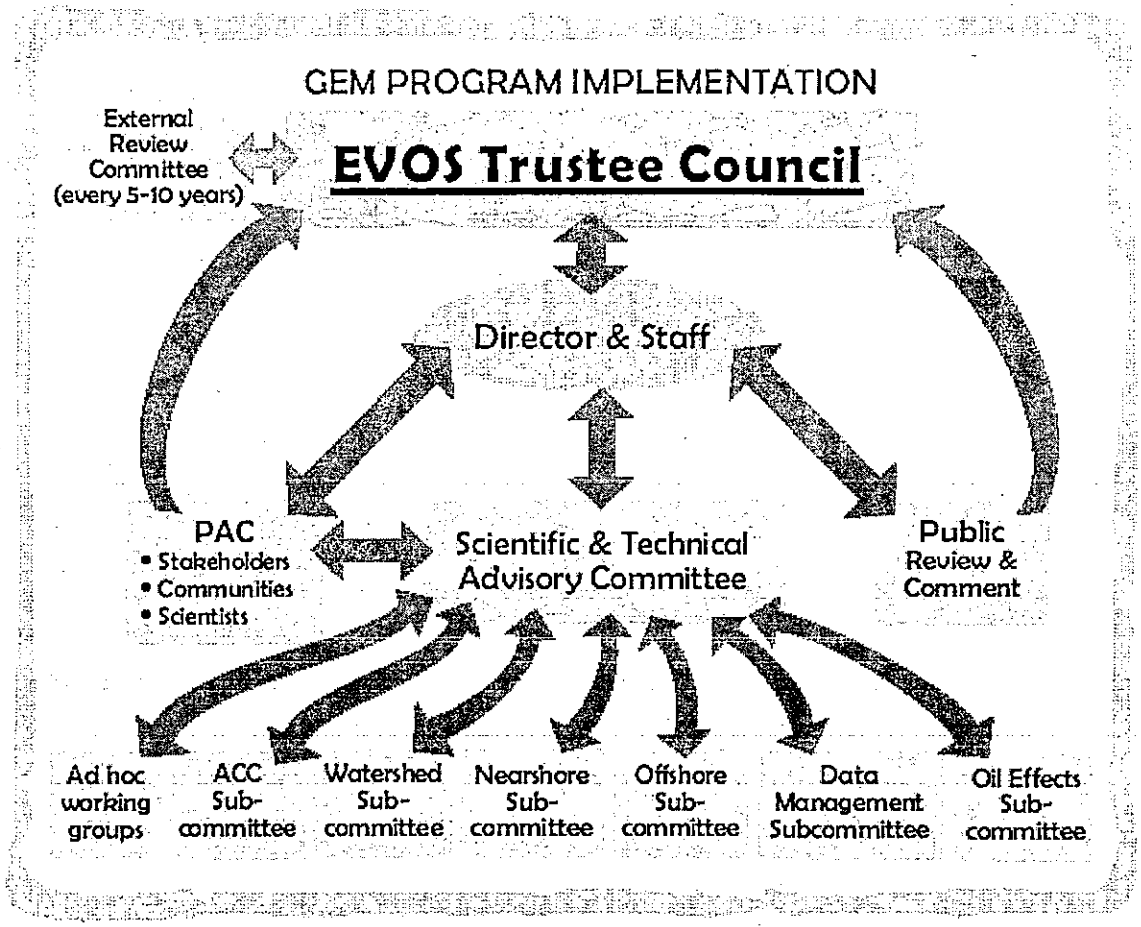


Figure 6.1. The organizational elements involved in GEM implementation. Modified in response to comments from the NRC, after GEM Program Document, Vol. I, Chapter 6, page 66.



Exxon Valdez Oil Spill Trustee Council

441 W. 5th Ave., Suite 500 • Anchorage, Alaska 99501-2340 • 907/278-8012 • fax 907/276-7178

MEMORANDUM

TO: Trustee Council

FROM: Molly McCammon
Executive Director

DATE: October 15, 2002

RE: Ratification of vote to extend offers on PWS 05 and 1010

In early October, the Trustee Council voted by e-mail (six affirmative votes) to extend the offer to purchase PWS 05 and PWS 1010 until October 31, 2002. This motion needs to be ratified at the next Trustee Council meeting – now scheduled for October 29.

Molly McCammon

From: Molly McCammon [molly_mccammon@oilspill.state.ak.us]

Sent: Monday, September 30, 2002 11:34 AM

To: Michele D Brown (michele_brown@envircon.state.ak.us); Drue Pearce (drue_pearce@ios.doi.gov); Craig Tillery (Craig_Tillery@law.state.ak.us); Dave Gibbons (drgibbons@fs.fed.us); Frank Rue (Frank_Rue@fishgame.state.ak.us); Jim Balsiger (jim.balsiger@noaa.gov)

Cc: Randy Hagenstein (rhagenstein@tnc.org); Alex Swiderski (Alex_Swiderski@law.state.ak.us)

The Nature Conservancy reports that they are close to signing a purchase agreement with the University of Alaska for two parcels that have already been approved for acquisition by the Trustee Council on behalf of the U.S. Forest Service. These are: PWS 05 – Valdez Duck Flats – purchase price of $125,000 and PWS 1010 – Jack Bay – purchase price of $1,130,000. The Trustee Council's resolutions authorizing these purchases have or will have expired shortly (PWS 05 expired September 1, 2002 and PWS 1010 will expire September 30, 2002). The Nature Conservancy is requesting Trustee Council action to extend the authorization in these resolutions through October 31, 2002. This would require signing of a purchase agreement by the University of Alaska by that date. These parcels, and in particular Jack Bay, have long been on the last of high priorities for protection by the Trustee Council. They are strongly supported by the city government and residents of Valdez.

Under your general operating procedures, Trustee Council #10 Emergency action, p. II-2, "In the event of an emergency requiring Trustee Council action before a meeting can be held in accordance with the procedures described herein, the Executive Director shall poll the Trustee Council and take action by unanimous agreement. Any decisions of the Trustee Council shall be reflected in the official record of the Trustee Council along with justification regarding the need to take emergency action. In addition, any emergency action taken shall be ratified at the next meeting of the Trustee Council."

Since it is not possible to schedule a meeting on such short notice, I am hereby requesting that the Trustee Council vote on the following motion and respond to me ASAP by email or fax:

MOTION: Section 3. (B) of the Trustee Council's resolution 01-12, authorizing the purchase of PWS 05 (Valdez Duck Flats), is amended to approve funding for the acquisition so long as a Purchase Agreement between the University of Alaska and the U.S. Forest Service (or The Nature Conservancy, acting on behalf of the U.S. Forest Service) is executed no later than October 31, 2002.

Section 4. (B) of the Trustee Council's resolution 02-03, authorizing the purchase of PWS 10 (Jack Bay), is amended to approve funding for the acquisition so long as a Purchase Agreement between the University of Alaska and the U.S. Forest Service (or The Nature Conservancy, acting on behalf of the U.S. Forest Service) is executed no later than October 31, 2002.

Thank you.

Molly McCammon
Executive Director
Exxon Valdez Oil Spill Trustee Council
441 West 5th Avenue, Suite 500
Anchorage, AK 99501
(907) 278-8012
(907) 276-7178 - fax
molly_mccammon@oilspill.state.ak.us

KEN 295
Crowther/Thorn
(aka Kurka/Brookwood)

Legal Description: Lots 1-15 and 17-23, Angler's Haven Estates, North Fork Road, Homer, Alaska

Acreage: 46.142 acres in Angler's Haven Estates consisting of 22 lots

Agency Sponsor: ADF&G

Location: Anchor River

Landowner: Craig A. Thorn and Debra K. Thorn and George S. Crowther

Appraised Value: $200,000.00

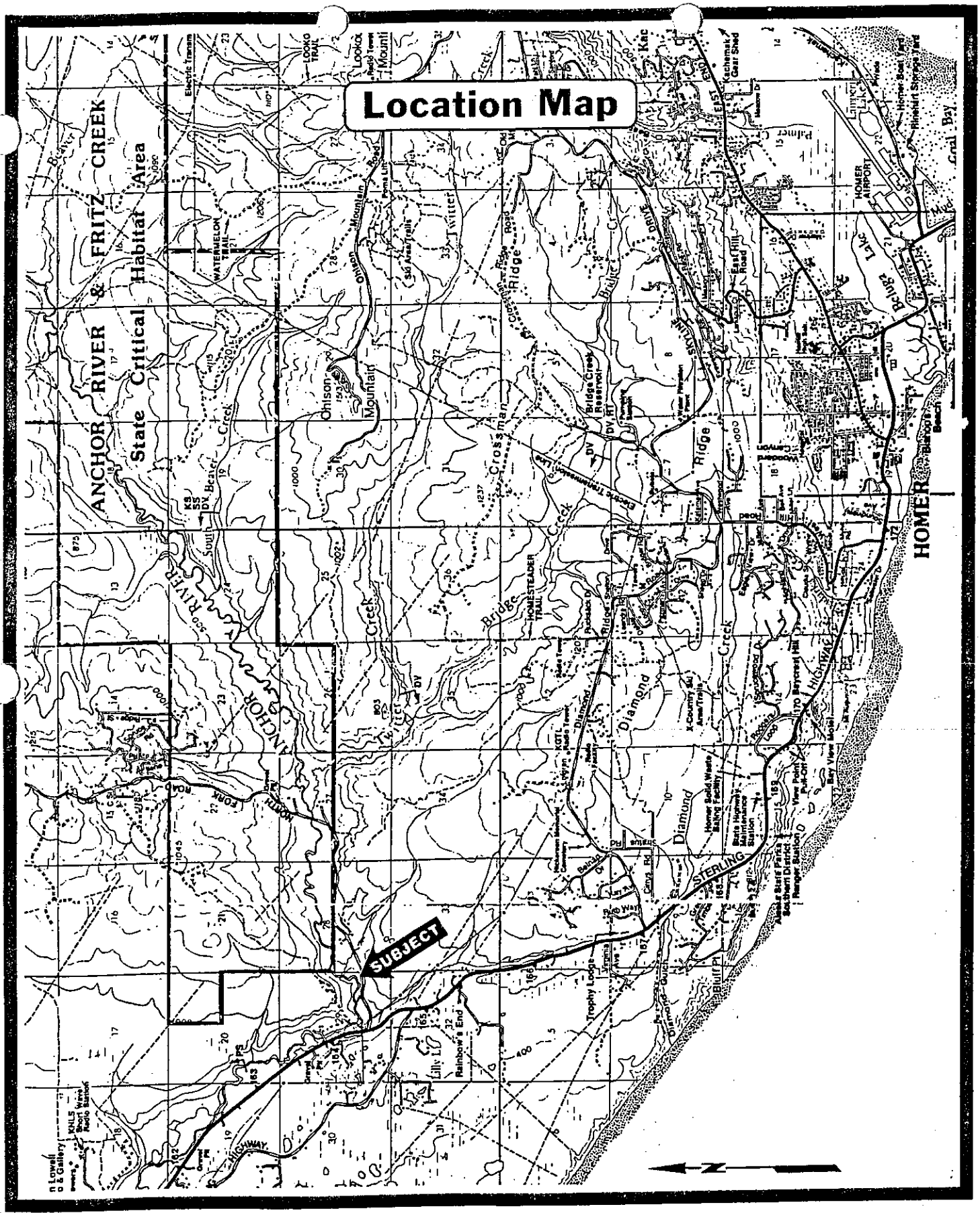
The Crowther/Thorn property is located along the lower Anchor River, less than a mile upstream of the Sterling Highway. It contains riparian and upland habitats of varying slope that support vegetative species such as willow, alder, spruce, birch and cottonwood trees. These terrestrial habitats provide structure to the riverbank and cover for the river, thereby protecting streambed substrates and the hydrological properties most important to high quality fish habitat. The river corridor in this area provides habitat essential to the production of Pacific salmon, steelhead trout and anadromous Dolly Varden. This section is particularly important to rearing juvenile fish of all species throughout the year, and over-wintering adult steelhead trout and Dolly Varden, as well as spawning Chinook salmon. This area also serves as a major migratory corridor each year for thousands of adults of all species attempting to reach upstream spawning grounds. Additionally, maintenance of quality habitat at the Anchor River is important to anadromous Dolly Varden throughout the lower Kenai Peninsula. Tagging studies have demonstrated that spawning and rearing Anchor River Dolly Varden are highly migratory and contribute populations that inhabit Deep Creek, Ninilchik River, and other Kachemak Bay tributaries. **In sum, this section is considered to currently possess fish habitat of exceptional quality that is important to the life cycle requirements of all fish species indigenous to the Anchor River.**

The Anchor River supports popular salt and freshwater fisheries for a diverse mix of wild game species. It boasts the largest freshwater fishery on the Kenai Peninsula south of the Kasilof River. An average of 28,000 angler days of sport fishing are directed at Chinook, coho, and pink salmon, steelhead/rainbow trout and Dolly Varden each year. The South Fork of the Anchor River is one of the most popular wild steelhead/rainbow trout catch-and-release fisheries in Alaska. It is also popular for Dolly Varden. During 1998, over 7,500 steelhead/rainbow trout were caught and released in the Anchor River. Over 2,000 Dolly Varden were harvested.

The Anchor River provides important habitat for several species of wildlife. Waterfowl like mallards, harlequin ducks, mergansers and teal all use the Anchor River. Most, if not all, wildlife that occur on the lower Kenai Peninsula utilize this riparian area. Mink, river otter, and beaver are common residents of this area. Black and brown bears migrate through in search of salmon and other foods. Generally the dense understory provides secure cover for travel and protection from human disturbance.

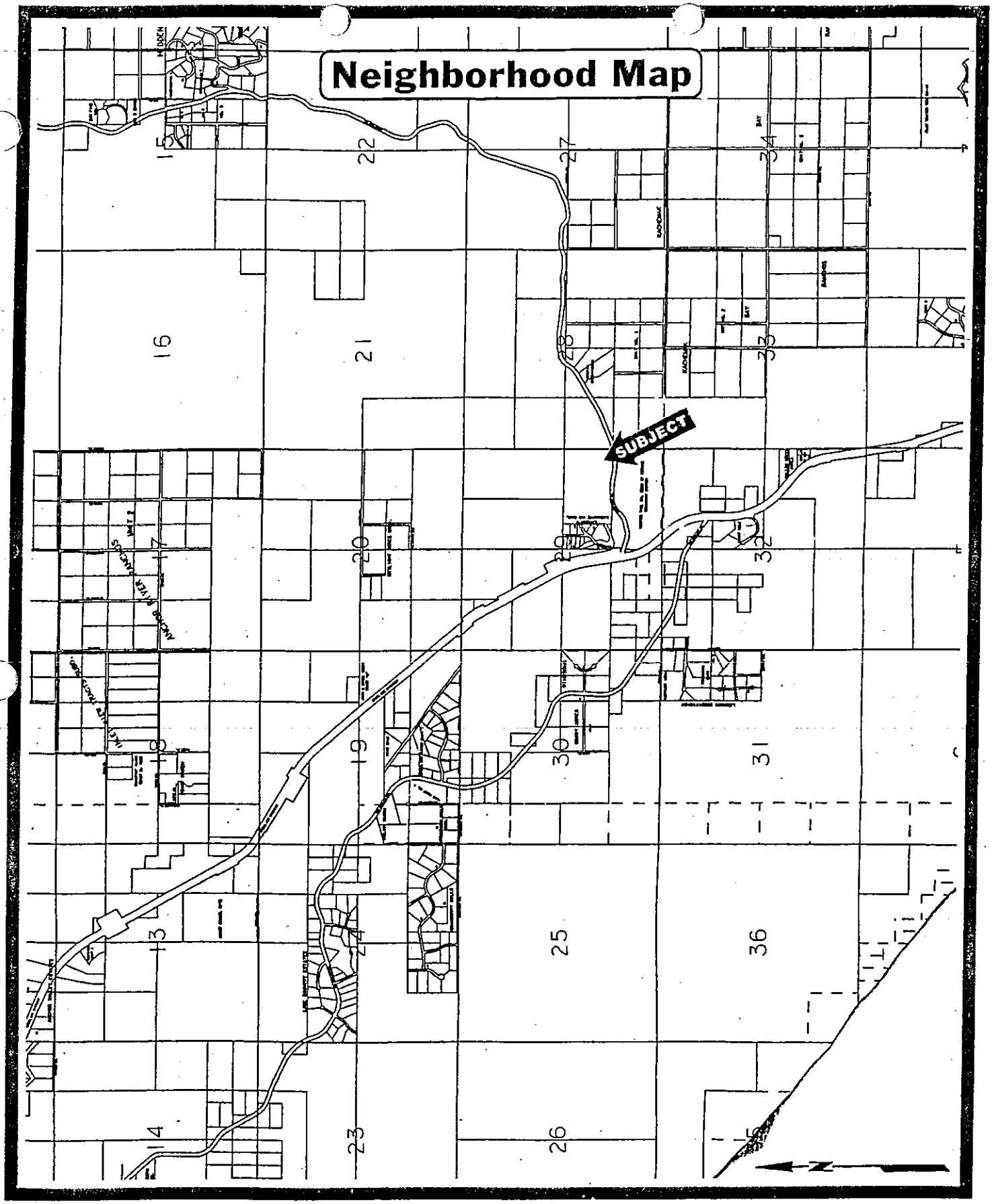
Moose occur throughout the region and especially in the riparian areas year-round. During spring, summer and fall moose utilize the riparian areas for feeding, rearing young and thermal protection from hot summer days. During winter, moose concentrate in the riparian areas because of available browse and relatively lower snow depth. During winters with deep snow moose tend to congregate in higher densities on the lower reaches of this river. For example, in 1992 a late winter survey showed that this section of river contained over 14 moose per square mile.

Another reason the department places a high value on this parcel is public access. On the South Fork of the Anchor River, small private parcels comprise nearly all of the land from the vicinity of the North and South Forks confluence at approximately Milepost 157 on the Sterling Highway upstream to about Milepost 164. Development of these private tracts has increased in the past five years, diminishing angler access to traditional fishing locations for Dolly Varden and steelhead/rainbow trout. The Crowther/Thorn property includes one of the most popular reaches for steelhead/rainbow trout.

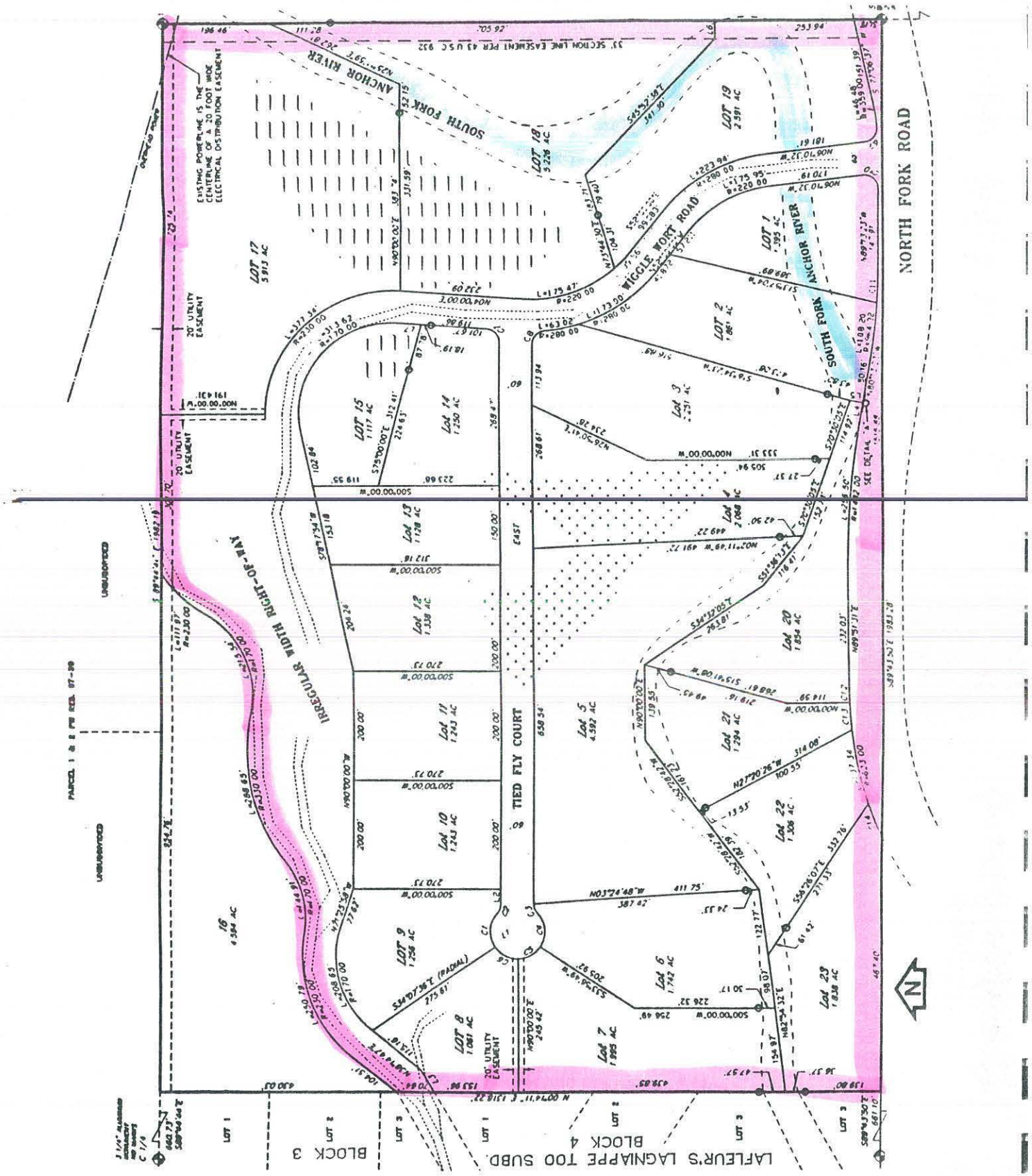


DERRY & ASSOCIATES, Inc.

Neighborhood Map



DERRY & ASSOCIATES, Inc.


NORTH FORK ROAD
WIGGLE WORT ROAD
TIED FLY COURT
IRREGULAR WIDTH RIGHT-OF-WAY
ANCHOR RIVER
SOUTH FORK
SOUTH FORK ANCHOR RIVER
EXISTING POWERLINE IS THE CENTERLINE OF A 20 FOOT WIDE ELECTRICAL DISTRIBUTION EASEMENT
33' SECTION LINE EASEMENT PER 43 USC 932
20' UTILITY EASEMENT
LOT 17 5.913 AC
LOT 18 5.226 AC
LOT 19 2.591 AC
LOT 1 1.395 AC
LOT 2 1.661 AC
LOT 3 1.231 AC
LOT 15 1.117 AC
Lot 14 1.250 AC
Lot 13 1.128 AC
Lot 12 1.338 AC
Lot 11 1.243 AC
LOT 10 1.243 AC
LOT 9 1.258 AC
LOT 8 1.081 AC
Lot 7 1.195 AC
Lot 6 1.742 AC
Lot 5 4.592 AC
Lot 20 1.854 AC
Lot 21 1.294 AC
Lot 22 1.308 AC
Lot 23 1.838 AC
16 4.534 AC
UNSURVEYED
PARCEL 1 & 2 PER REC. 97-29
LAFLEUR'S LAGNIAPPE TOO SUBD.
BLOCK 3
BLOCK 4
LOT 1
LOT 2
LOT 3
SEE DETAIL
N
DERRY & ASSOCIATES, Inc.

RESTRICTED USE APPRAISAL REPORT

CLIENT: Mr. Brad Meiklejohn
The Conservation Fund
9850 Hiland Rd.
Eagle River, AK 99577

APPRAISER: Julie Derry
Derry & Associates, Inc.
Box 951
Homer, AK 99603

SUBJECT: Lots 1-15 and 17-23, Angler's Haven Estates
North of North Fork Rd.
Homer, AK

PURPOSE OF THE APPRAISAL: To estimate Market Value as defined by the Office of the Comptroller of the Currency under 12 CFR, Part 34, Subpart C.

INTENDED USE OF REPORT: For the sole purpose of assisting the client, The Conservation Fund, in determining the Market Value of the subject property as of June 30, 2002, for use in purchase negotiations.

INTEREST VALUED: Fee Simple

EFFECTIVE DATE OF VALUE: June 30, 2002

DATE OF REPORT: July 3, 2002

APPRAISAL DEVELOPMENT AND REPORTING PROCESS: The Sales Comparison Approach is utilized to estimate the current Market Value of the property. A search of recorded documents, the appraiser's data bank, MLS data, and inquiries with local real estate agents were made to confirm the most recent sales of neighborhood lots with and without frontage on the Anchor River. The most recent transactions within a similar size range were selected and analyzed in the valuation process. Market based adjustments were made to the comparables for differences in comparison to the lots appraised. When the process was complete the comparables developed indications of value for the individual lots. Analysis of multi-lot transactions provided market data to develop a discount for estimating the Market Value of the lots combined.

The Cost and Income Approaches are not applicable to this assignment because the property consists of vacant land.

To develop the estimate of value the appraiser performed a **complete appraisal** process, as defined by the Uniform Standards of Professional Appraisal Practice. Accordingly, no departures from Standard 1 were invoked.

This **restricted appraisal report** sets forth only the appraiser's conclusion of value. Supporting documentation is retained in the file.

REAL ESTATE APPRAISED: A physical inspection of the subdivision was made on June 30, 2002. The subdivision is located on the south end of the North Fork Road, east of the Sterling Highway intersection about 1,000 feet and north of the Homer community center 8.5+/- miles. The North Fork Rd. is a two-lane gravel road maintained by the State of Alaska. The neighborhood is a rural residential area with much of the acreage remaining in large, unsubdivided (40+ acre) tracts. The appeal of some acreage is enhanced by a view amenity or frontage on the Anchor River.

The 23-lot subdivision was platted in 2000 (see facing plat map). Fourteen of the lots have frontage on the South Fork of the Anchor River. Two other lots have frontage on a small man-made pond and two of the larger riverfront lots also have pond frontage. Typical lot size is 1.3 to 2+/- acres; four of the lots are in the range of 4-6+/- acres. The size of the smaller lots (<2 acres) is less than typical for the neighborhood.

Tied Fly Court through the middle of the subdivision has not been constructed. Wiggle Wort Rd. is a 1+ lane gravel road, however would need additional upgrading to satisfy Kenai Peninsula Borough road standards. There has been river erosion that has damaged the one-lane bridge crossing the Anchor River on Wiggle Wort Rd. Some planking repair is also needed. Lots 20-23 have developed access via the North Fork Rd.

The southern two-thirds of the subdivision consists of mostly level topography with the lots gradually sloping toward the South Fork of the Anchor River. The riverbank is low and easily traversable. Riverfront lots are platted to the center of the river which reduces total lot usability. Usability within the northern portions of Lots 8-13, 15 and 17 is impacted by a steep northerly slope/bank up. Tree cover is predominately a desirable mix of cottonwood, willow, alder, and some spruce toward the northwest corner of the subdivision.

The former landowners extracted gravel from primarily the eastern one-third of the subdivision; mostly affecting Lots 1, 2, 14, 15, 17, 18, and 19. The northern portions of Lots 1 and 2 are cleared/graveled, formerly used for equipment storage. The usability of Lots 17 and 18 is impacted by the irregular shape and limited quantity of ground surrounding the ponds. All of the lots are valued assuming no contaminated soils or residue on-site.

Electrical bisects the northeast corner of Lot 17 and could be extended to service the remaining lots. Homer Electric Association requires consumer payment for line extensions. The lack of electrical reduces the appeal/marketability of the lots due to the high extension costs for individual users.

Due to the lack of public water and sewer on-site systems would have to be developed. All of the lots are valued assuming that a certified/engineer approved water and septic system can be developed. Due to the proximity to the Anchor River and wetlands identified on Lots 4 and 5 more costly, engineered septic systems may be required.

HIGHEST AND BEST USE: Rural residential/recreational use.

PROPERTY HISTORY: The former owner marketed subdivision lots for several years at varying prices. They were most recently listed at Re/Max of Homer from February 22, 2001 until cancellation of the listing on January 11, 2002 when the owner was foreclosed

on for non-payment of the outstanding deed of trust. Listing prices had ranged from $25,000 for the smaller non-riverfront lots to $39,500 for the larger riverfront lots. There were no sales. Current owners are Craig A. and Debra K. Thorn (20% interest) and George S. Crowther (undivided 80% interest)

PROPERTY VALUATION: To estimate the current Market Value of the property a search was made to confirm sales of lots within the neighborhood with an emphasis on lots with Anchor River frontage. The following table lists the most representative transactions analyzed in the valuation process.

Comp No.	Legal Description	Sale Date	Sale Price	Size (Acres)	Price/ Acre	Sale Terms
1	N2 SW4 E of Sterling Hwy.R-O-W,S29, T5S,R14W	9/00	$32,000	8.22	$3,893	16%dn
2	L1, B2, Anchor Valley Est.	11/99	$36,000	8.87	$4,059	Cash
3	L8, B1, Norwegian Woods	9/99	$28,000	7.43	$3,769	Cash
4	L2, August Knight	7/98	$15,000	2.95	$5,085	12%dn
5	Trt. F, River Ridge	9/97	$31,500	5.33	$5,910	Cash
6	Trt. B, River Ridge	9/00	$20,000	1.25	$16,000	15%dn
7	L7, B2,Sprucegate	7/00	$13,800	1.74	$7,931	29%dn
8	L2, B3, Williams North Fork	4/02	$7,500	1.02	$7,353	20%dn
9	L2, Quarter Moon	8/01	$9,900	1.63	$6,074	20%dn
10	L14, Anchor Estates	9/01	$8,000	1.68	$4,762	19%dn
11	L3, B1, Cranberry Hills	3/02	$12,900	3.04	$4,243	Cash

Comparables 1-6 are analyzed in the valuation of the riverfront lots and C7-11 for the lots lacking a riverfront amenity. In the analysis process the comparables are adjusted for differences in comparison to "key" subdivision lots. Elements of comparison include sale terms, market conditions (date of sale), lot size, location/road access, availability of utilities, topographic features, riverfront amenity, and legal constraints. As requested the lots are valued as-is, recognizing the existing lot configuration, topographic features, accessibility, etc.

Following analysis of the comparables and general market data the estimated Market Value of the 22 lots combined as-is, on a cash sale basis is concluded at:

$200,000

The value conclusion assumes that approved (engineer/DEC) water and septic systems can be constructed on each lot and there is no on-site contamination.

Julie Derry

Indicated Exposure Time: 1-2 years

Estimated Marketing Time: 1-2 years

TONY KNOWLES, GOVERNOR

DEPARTMENT OF FISH AND GAME

OFFICE OF THE COMMISSIONER

P.O. BOX 25526
JUNEAU, ALASKA 99802-5526
PHONE: (907) 465-4100
FACSIMILE: (907) 465-2332

To: Molly McCammon, Executive Director
EVOS Trustee Council

From: Frank Rue, Commissioner
Alaska Department of Fish and Game

Date: June 7, 2000

Subject: KEN- 293, 294, 295

Pending resolution of designated funds for small parcel acquisitions, the Alaska Department of Fish and Game (ADF&G) nominates KEN-293, -294 and -295 as Parcels Meriting Special Consideration. These parcels are located on the South Fork of the Anchor River and offer a unique opportunity to secure much needed habitat protection and recreational access along a river corridor highly threatened by development. Similar to the Kenai River, much of the lower Anchor River is in private ownership. Acquisition of these parcels will benefit Exxon Valdez Oil Spill (EVOS) restoration goals and facilitate agency management of fish and wildlife populations on the lower Kenai Peninsula.

cc: L. Trasky
C. Slater

KEN 310
Swartz Enterprises

Legal Description: Lot 14, Block 8, Ninilchik Townsite, Ninilchik, Alaska

Acreage: 0.185 acres

Agency Sponsor: ADNR & ADFG

Location: Ninilchik River

Landowner: Swartz Enterprises

Appraised Value: $6,000.00

This parcel is downstream and immediately adjacent to several parcels owned by Alaska Department of Fish and Game, including the Icicle Seafoods property acquired with Trustee Council funding in 2002. This lot borders the Ninilchik River, one of southcentral Alaska's most important sportfishing rivers.

The public has used this area of the Ninilchik River for decades while pursuing the popular king salmon fishery each spring, and later for Dolly Varden, silver salmon and steelhead trout. Although private land, most anglers are not aware that this land is not publicly owned. Anglers primarily access this parcel on foot, following traditional access trails along the riverbanks.

The Ninilchik River supports an enhanced hatchery-supported and native run of king salmon, providing outstanding sportfishing opportunities for anglers. The Ninilchik is one of the finest bank-accessible sportfisheries for king salmon on the Kenai Peninsula, and is extremely popular and productive. The area owned by Swartz Enterprises supports a great deal of angler activity as the fishing is particularly productive here.

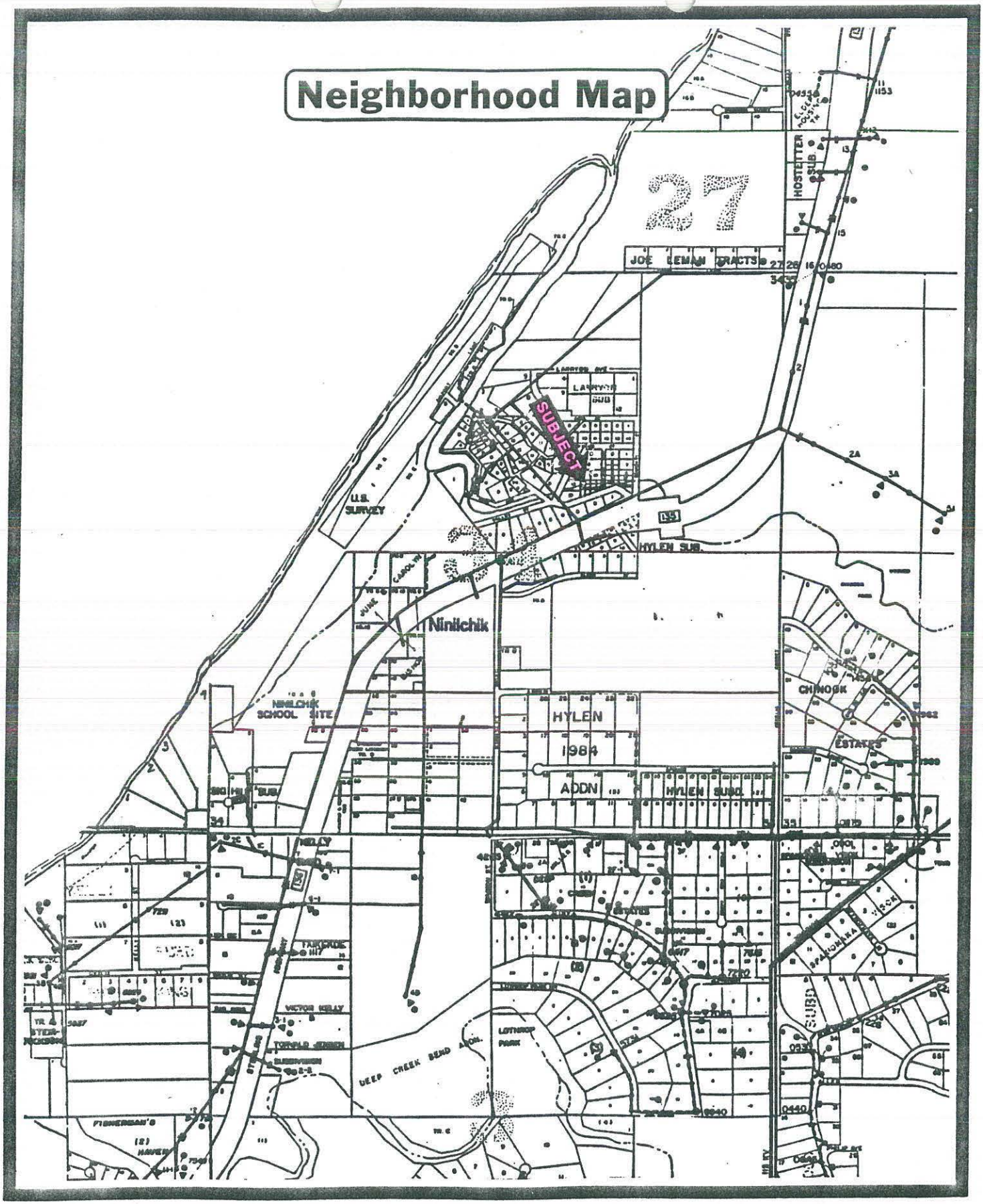
The lands are characterized by their river valley riparian habitat, with willows, scattered spruce and small cottonwoods and other floodplain vegetation. Wildlife species that commonly use this area include harlequin ducks, mergansers, mink, otter, black and brown bears, and moose. This is an important winter feeding area for moose and often 8-12 moose can be counted in or near the subject property on a winter day. During the early summer, harlequin ducks are commonly viewed in the downstream portion of this property, and other wildlife species can be seen occasionally throughout the year.

This parcel is subject to periodic flooding during high water events such as fall rainstorms, and therefore has limited development potential for recreational homes or other recreational access developments.

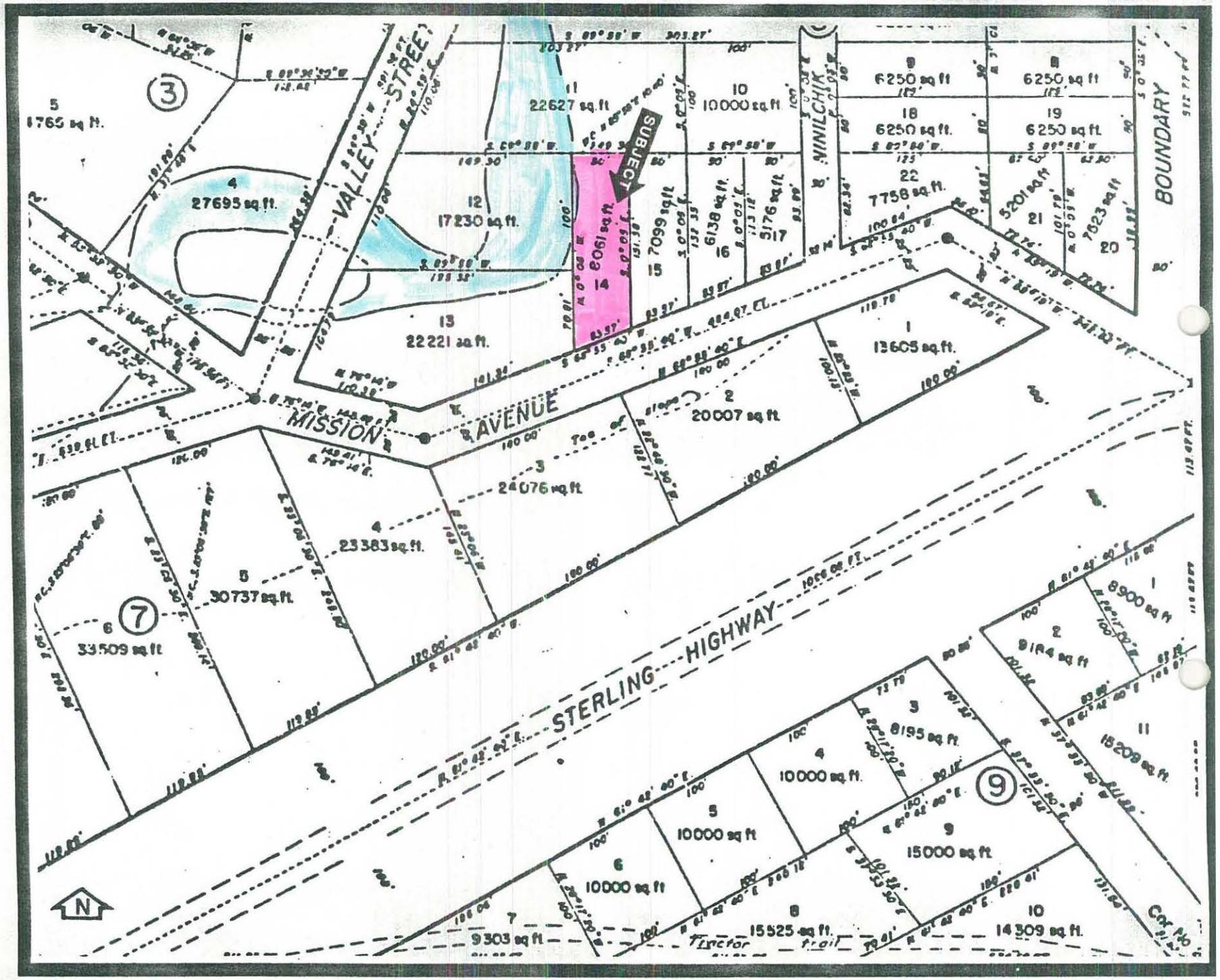
Support of the sportfishing industry is the most important basis of the Ninilchik community economy. The number of businesses that cater to anglers is enormous, and include B&B's, lodges, restaurants, cafes, taxidermy shops and other retail businesses. These businesses depend upon having predictable fishing destinations available for their clients and customers. The Swartz Enterprise parcel provides one of the most important destinations that support the area's tourism economy.

Should access to the parcel be blocked by a private owner, the public could lose forever one of Alaska's premier king salmon sportfishing locations. The loss of access to the public would be significant enough, but a sale would also mean that a sensitive riparian section of the Ninilchik River would be subject to development pressures. This could result in the deterioration of important riparian fish habitat, loss of important winter moose feeding habitat, and loss of harlequin duck nesting habitat. Social conflicts with the new owners and anglers wishing to access traditional fishing holes would spring up and need to be dealt with. The scenic quality of the area would be diminished if the currently undeveloped section of the Ninilchik River should lose this status.

Neighborhood Map



DERRY & ASSOCIATES, Inc.



DERRY & ASSOCIATES, Inc.

RESTRICTED USE APPRAISAL REPORT

CLIENT: Mr. Brad Meiklejohn
The Conservation Fund
9850 Hiland Rd.
Eagle River, AK 99577

APPRAISER: Julie Derry
Derry & Associates, Inc.
Box 951
Homer, AK 99603

SUBJECT: Lot 14, Block 8, Ninilchik Townsite
Ninilchik River frontage on Mission Avenue
Ninilchik, Alaska
KPB Parcel No.: 157-124-06
Owner of Record: Swartz's Enterprises, Inc.

PURPOSE OF THE APPRAISAL: To estimate Market Value as defined by the Office of the Comptroller of the Currency under 12 CFR, Part 34, Subpart C.

INTENDED USE OF REPORT: For the sole purpose of assisting the client, The Conservation Fund, in determining the Market Value of the subject lot as of June 30, 2002 for purchase negotiations.

INTEREST VALUED: Fee Simple

EFFECTIVE DATE OF VALUE: June 30, 2002

DATE OF REPORT: July 10, 2002

APPRAISAL DEVELOPMENT AND REPORTING PROCESS: The Sales Comparison Approach is utilized to estimate the current Market Value of the subject property. A search of recorded documents, the appraiser's data bank, MLS data, and inquiries with real estate agents were made to confirm the most recent sales and current listings of lots in the Ninilchik Townsite. The most recent transactions were selected and analyzed in the valuation process. Adjustments were made to the comparables for differences in comparison to the lot appraised. When the process was complete they developed indications of value for the subject property.

The Cost and Income Approaches are not applicable to this assignment because the property consists of vacant land.

To develop the estimate of value the appraiser performed a **complete appraisal** process, as defined by the Uniform Standards of Professional Appraisal Practice. Accordingly, no departures from Standard 1 were invoked.

This **restricted appraisal report** sets forth only the appraiser's conclusion of value. Supporting documentation is retained in the file.

REAL ESTATE APPRAISED: A physical inspection of the lot and comparables was made on June 30, 2002. A 1999 survey by Roger W. Imhoff, RLS, identifies lot size at 8,061 sq. ft. (.185 acre). The lot has 53.6' of frontage at the south on the two-lane, gravel State maintained Mission Avenue that provides access from the Sterling Highway to the Ninilchik Townsite. The Ninilchik River, very popular for salmon fishing, borders the northern half of the lot along the west boundary. The location of the River was not identified on the survey and may encroach onto the lot. Site topography consists of a gradual northerly slope down from the road with the northern portion of the site generally level and close to river elevation. Ground cover is a mix of native grasses, willow and alder.

The Ninilchik Townsite is located on Food Zone map 020012 3525A. The area in close proximity to the river is identified as a Zone A, "areas of 100-year flood, flood elevations and flood hazard factors not determined". The remaining land is classified as a Zone C, "areas of minimal flooding".

Although the appeal of the lot is enhanced by the riverfront amenity usability of a majority of the site is significantly impaired due to the Kenai Peninsula Borough's restriction from constructing improvements within 50 feet of the river. Since the lot is only 50 feet wide and the Ninilchik River extends at least halfway along the west boundary, only a small remainder adjacent to Mission Avenue is estimated to be beyond the affected area. The Borough's Kenai River Office in Soldotna should be contacted for specific guidelines regarding development restrictions/options. A current survey of the lot with delineation of the River and 50-foot wide restricted area would also be helpful in clarifying site usability. The appraiser reserves the right to modify the value conclusion if a survey of the lot reveals a variation in location of the river and quantity of developable site area.

HIGHEST AND BEST USE: Recreational/residential use.

PROPERTY HISTORY: The lot has been listed for sale since July, 1999 at $10,500 with seller provided financing available with a "large" down payment. The listing agent reports no offers to date although the State of Alaska, Division of Parks is reportedly interested in acquiring the lot.

PROPERTY VALUATION: The following table lists the comparables analyzed in the valuation process. To minimize large adjustments for variations in location and size all of the transactions are in close proximity within the Ninilchik Townsite.

Comp No.	Legal Description	Sale Date	Sale Price	Size (Sq.Ft.)	Price/ Sq.Ft.	Sale Terms
	Ninilchik Townsite					
1	L20, Block 8,	10/99	$9,000	7,523	$1.20	Cash
2	Lot 1, Block 4	3/02	$5,000	1,936	$2.58	Cash
3	Lot 6, Block 2	3/02	$10,000*	8,434	$1.19	Cash
4	Lot 3, Block 7	5/00	$12,000	24,076	$.50	21% dn
5	Lot 1, Block 7	Listing	$16,500	13,605	$1.21	Nego.
Subject	Lot 14, Block 8	Current	---	8,061	---	Cash

*Net land value

In the analysis process the comparables are adjusted for differences in comparison to the subject property. Elements of comparison include sale terms, market conditions

(date of sale), lot size, location/road access, availability of utilities, topographic features, riverfront/view amenity and legal constraints.

Following adjustment of the comparables the estimated Market Value of the subject property is concluded at:

$6,000

The value conclusion is based on cash sale terms and assumes a large portion of the lot is affected by the Borough's 50-foot wide river setback. The appraiser reserves the right to modify the value conclusion if a current survey reveals a variation in the estimated quantity of site area not affected by the setback.

Julie Derry

Indicated Exposure Time: 1-2 years

Estimated Marketing Time: 1-2 years

KEN 310

STATE OF ALASKA

DEPARTMENT OF NATURAL RESOURCES

Commissioner's Office - EVOS

TONY KNOWLES, GOVERNOR

550 West 7th, Avenue SUITE 1400
ANCHORAGE, ALASKA 99501
PHONE: (907) 269-8431
Fax: (907) 269-8918

June 30, 2000

Molly McCammon
Executive Director
Exxon Valdez Oil Spill Trustee Council
645 G Street, Suite 401
Anchorage, AK 99501

Dear Ms. McCammon;

The Department of Natural Resources and The Department of Fish and Game would like to request that Parcels KEN 309 nominated for consideration by Icicle Seafoods of Homer and KEN 310, nominated by Schwartz Enterprises be considered by the Trustee Council as Parcels Meriting Special Consideration. These parcels were evaluated by the Habitat Protection Work Group and scored low.

These parcels are located downstream and immediately adjacent to a large parcel owned by ADF&G. These lots border or are near the Ninilchik River, one of south central Alaska's most important sportfishing rivers. These lots are part of the original Ninilchik townsite subdivision, with roads and lots platted with no logical relationship to the terrain. Some lots actually straddle the river and the public has used this area of the river for sportfishing access for decades.

These parcels are currently for sale and if sold as individual lots or as a bulk sale to another private developer, the public could lose forever one of Alaska's premier king salmon sportfishing locations. In addition, potential development of these parcels could well result in the deterioration of important riparian fish habitat, loss of important winter moose feeding habitat, loss of harlequin duck nesting and rearing habitat.

It is our intent that this parcel be managed of this consistent with its existing use, and that of the adjacent ADF&G property, ensuring that the ecological, natural, physical and scenic values of the subject property will be protected in perpetuity for the benefit of fish and wildlife resources and services that were injured in the *Exxon Valdez* oil spill.

Thank you for your consideration of this parcel.

Sincerely,

Marty K. Rutherford
Deputy Commissioner