AGENDA B-1
JUNE 2004

Executive Director's Report

Welcome to new Coast Guard representatives

Admiral Underwood's last meeting was in April, and his District 17 replacement is Admiral James Olsen. I understand that CDR Mike Cerne will sit in place of Captain Rich Preston, whose last meeting was also in April, though for this meeting CDR Greg Busch will represent the Coast Guard.

Update on Council Chair/ED meeting

A draft summary (still being finalized) of the annual Council Chair and Executive Director's meeting, prepared by the 2004 host Council, is contained under Item B-1(a). The meeting included Bill Hogarth, Rebecca Lent, and Jack Dunnigan from NOAA Fisheries Headquarters, as well as Congressman Wayne Gilchrest and Senator Daniel Inouye. Highlights of the meeting included discussion of the following: (1) NOAA sponsored fall 2004 fisheries conference, and our proposed spring 2005 fisheries conference; (2) Magnuson-Stevens Act reauthorization issues; (3) annual NOAA and Council budget processes; (4) enforcement and VMS policies; (5) ecosystem-based management approaches; (6) regulatory streamlining process (RSP); (7) cooperative research; (8) EFH; (9) fish consumption and health issues; (10) litigation; and, (11) Marine Protected Area (MPA) authorities and Council role (see letter under Item B-1(b) from the Director of the National Marine Sanctuary Program, which discussed three specific issues raised at our annual meeting).

More specifically on the RSP issue: In April I provided you a copy of the draft operating guidelines for the Regulatory Streamlining Process (RSP) being proposed by the agency, and encouraged you to review this document as it implies significant changes to the way we do business. We discussed this issue at the annual Chair/ED meeting, where we (along with some of the other Councils) expressed serious concerns over the proposed RSP process in general. We also expressed specific concerns, particularly where the numerous regulatory critical control points (RCCPs) would require written sign-off from the Regional Administrator and NOAA General Counsel before the Council could proceed to the next step. We noted that we are already attempting to incorporate the spirit and intent of RSP (i.e., frontloading assurances of analytical completeness, NEPA compliance, and the attendant internal review) in our region, with ever-increasing success. Our proposal to the NOAA leadership was to allow each Council/Region to continue working together to accomplish the underlying intent of RSP, working within the construct of the draft guidelines, and to consider the RCCPs as 'feedback loops' rather than 'permission slips'. Further, we committed to designating a pilot project in each region where we would follow the specific guidelines, in a non-binding manner, to see whether and where any pitfalls occur. Finally, we would develop a Regional Operating Agreement (ROA) which generally defines roles, timelines, and expectations of the Council and NOAA relative to accomplishing RSP, but would not contain the specific agency sign-offs suggested in the draft guidelines. In the meantime we are awaiting the final draft of the guidelines from NOAA Headquarters, hopeful that those guidelines will accommodate the Councils' concerns expressed at the annual meeting.

Myself and other Council staff, along with the Council Chair, have met with NOAA Fisheries Alaska Region to discuss a regional operating plan, and to specifically discuss the GOA rockfish demonstration project as a pilot project for the RSP process. We are still in the process of drafting a regional operating agreement, but we have completed an Action Plan for the GOA rockfish program (the first step in the RSP process), which we will discuss further under agenda item C-5. That Action Plan, along with the Council's direction on alternatives, sets the stage for the formal analysis and subsequent RSP steps.

NOAA Research Review Team - Draft Report

The FY 2004 Appropriations Reports challenged the organization of research within NOAA, particularly the Office of Oceanic and Atmospheric Research (OAR). In response NOAA requested its Science Advisory Board to establish a review team with the broad task of providing findings and recommendations to enhance NOAA's research organization. The draft report, under Item B-1(c), is open for comment until June 25. Some of the recommendations could result in significant changes to the NOAA research organizational structure, including some that could directly impact fisheries science and management. For example, on page 13 of the report, under the heading of 'Research Organization within NOAA', there is a recommendation to establish a position of Associate Administrator for Research reporting directly to the NOAA Administrator budgetary and programmatic oversight for all NOAA research. Further, on page 17 of the report, under the heading of 'Research Location within NOAA', there is the recommendation that "*research being conducted in NMFS and NOS could migrate to OAR, but only if the scientific advice associated with ecosystem-based regulatory responsibilities went with the research role. Such a change will involve changing the culture in the research organization to accommodate the need for timely advice for policy and regulation*".

The essence of these recommendations could result, for example, in a new line office within NOAA (or imbuing the existing OAR with a greater authority over all NOAA research), and the possibility of the Fisheries Science Centers being migrated out of NMFS and into OAR. I believe these recommendations have serious implications, and have the potential to take the 'separation of science and management' to a point that could be extremely detrimental to fisheries management. I bring this to the attention of the Council family in the hope that you will read this report and provide your own comments. I intend to work with the Council Chair following this meeting and provide comment prior to the June 25 deadline. I encourage all of you to pass along your thoughts relative to comments that we will provide on behalf of the Council.

Sablefish report from Alverson

A recent Council mailing contained a University of Washington report titled 'Study of Supply Effects on Sablefish Market Price'. The study was sponsored by a number of fishing organizations and government agencies, including NMFS, PSMFC, and the NPFMC. I agreed to allow Bob Alverson (FVOA was one of the primary sponsors) a few minutes today to provide a brief summary to the Council.

Comment on sea otter listing

In April we received a report from the USFWS on a proposed 'threatened' listing of the southwest population segment of sea otters. Item B-1(d) is a copy of that action memo, the news release from USFWS, and the FEDERAL REGISTER notice. Comments are due by June 10 (tomorrow), and I brought these materials forward in the event the Council wanted to consider comment on the proposed listing.

Draft AP Committee Report

The Council established a small committee of three (Roy Hyder, Kevin Duffy, and Dennis Austin) to review our policy on Advisory Panel composition and processes. They met in May and have provided some initial recommendations under Item B-1(e). The Council may wish to review these recommendations during the week, and then we can revisit the issue under agenda item D-3, where we typically discuss issues related to staff tasking and Council committees.

Conference proceedings available

The proceedings from our November 2003 conference in Washington, D.C. (Managing our Nation's

Fisheries: Past, Present, and Future) are done. I hope that you all have received your copy - if not we have them available. Kudos to David Witherell for pulling this together - I think it is a great, and timely, reference manual on fisheries management programs around the country. I am starting to plan for a spring 2005 conference, which will focus on MSA reauthorization issues. In the meantime, NOAA Fisheries is moving ahead with a more general fisheries conference which will occur later this fall.

Easy Biz Airline Reservations

Head's up to Council, SSC, and AP members. We are in the process of moving our travel reservations system to an Alaska Airlines Easy Biz account. This will allow everyone on the Council's travel budget to access a Council-specific website to make your travel reservations, and the Council office will be billed directly. Bookings through the travel agency may still be necessary for itineraries that are outside of Alaska Airlines. We will provide you the specific details when our account becomes fully operational.

August/September seafloor profiling project

Item B-1(f) is a letter from LGL Alaska Research Associates, Inc. which describes a study to be conducted later this summer, involving seismic surveying in areas of the Gulf of Alaska. They will be conducting a number of fishery organizations directly, but I wanted to alert industry participants by providing the maps of the study areas, and encouraging you to provide comments regarding any potential conflicts.

Evening reception

Tonight, at about 5:30 pm, there will be a reception in the Cambridge/Oxford room. It's open to all and hosted by fishing industry organizations and the Pacific States Marine Fisheries Commission.

NPRB project funding summary

At our last meeting the Council requested a summary of research projects funded by the North Pacific Research Board (NPRB). Dr. Pautzke provided the summary under Item B-1(g), which includes a comparison of NPRB funded projects to research priorities identified by our own SSC.

COUNCIL CHAIRS AND EXECUTIVE DIRECTORS' MEETING
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APRIL 13-15, 2004

DRAFT
SUMMARY OF SIGNIFICANT RESULTS

A. Introduction

Following a Hawaiian chant and introductions, Roy Morioka (Chair) opened the meeting with welcoming remarks. He set the scene, by detailing the distinguished presenters, and using Hawaiian terms he expressed the wish that we would move onward and forward (Hawaiian: imua), in a spirit of cooperation (Hawaiian: laulima).

Bill Hogarth continued the introduction, thanking the Western Pacific Council for hosting the meeting, and remarked that he has been visiting Hawaii frequently of late, in relation to the re-opening of the longline swordfish fishery after a 3 year closure. He hoped that this meeting of the Council Chairs and Executive Directors would be a positive, giving a different message from that put out by the 'doom and gloom' merchants dominating the current press. In a paper which he is producing for Earth Day, he states that the negative perception of the condition of our ocean resources is wrong. **The draft of this paper will be available very soon and copies will be made available for participants of this meeting.**

Dr Hogarth recognized the importance of Congressman Gilchrest and Senator Inouye, who both have been, and are, staunch supporters of US fisheries and their management. The current budget was described as good, but tough. Restructuring of the budget means that some items which should have been funded have been missed, and as a consequence there has had to be some reprogramming. This has involved removing monies from base programs and applying it elsewhere, and so the budget has become very confused. There will be an impact on the Councils, which will be discussed in detail during the meeting.

In Dr Hogarth's view, National Environment Policy Act (NEPA) is the prime reason why litigation is less of a problem now. For that reason more NEPA funding should be directed to the Councils. Other issues marked for focused discussion in the upcoming meeting are Magnuson-Stevens Act (MSA) reauthorization, the Ocean Commission Report, Enforcement, especially Vessel Monitoring Systems (VMS) which is seen as a great tool for enforcement, management and safety. Outreach is seen as a means of promoting the agency, and is realized partly through constituency meetings and conferences, hence the need for another National Fisheries Conference later this year. There appear to be less negative comments on fishery issues made to

the legislature this year, and it is felt that part of the reason for that is better outreach, and explanations of fishery management processes and decisions to the public.

There have been notable successes, for example in the field of gear technology, where excellent work has been done in Pascagoula, throughout the regions and by industry. Work to reduce turtle takes in the NE distant fishery has enabled the opening of the Hawaii longline swordfish fishery, and there are moves afoot to transfer this technology to other nations. The Admirals' initiative to develop a matrix management and budget process is bringing NOAA closer together.

Dr Hogarth stated that there is no bigger supporter of the Council process than himself, and that this is the way to manage fisheries, even though there is room for improvement. In conclusion, the meeting was informed that decisions about local Regional Administrator (RA) and Assistant Regional Administrator (ARA) posts were going to be made by the end of the week, and that Bill Fox would be moving to the West Coast, and Doug DeMaster would be working at headquarters to focus on the issues of observers and Marine Recreational Surveys.

Deputy Assistant Administrator for the National Ocean Service (NOS), Jamie Hawkins, added a few words, indicating that this was a good opportunity to move forward in a spirit of 'laulima', saying that he was witnessing at this time the greatest degree of open communication between the Directors of Fisheries and the Directors of the Ocean Service.

C. Report on Managing the Nation's Fisheries Conference – and proposed Sequel Conference in March 2005

Chris Oliver reported that pre-publication copies of the report on the 2003 Nation's Fisheries Conference were available at the meeting. 2000 hard copies published in the initial run went to attendees, the Councils and NMFS Regional Offices. The remaining spare copies will be held at the NPFMC office. The timing of the release of this report is opportune given that the Ocean Commission Report is coming out at about the same time. PFMC staff prepared a draft press release, which will be distributed to the Councils to ensure that all Councils are on the same page regarding the Ocean Commission Report, and are prepared to respond to the media informatively on key issues.

The Councils agreed to a follow up conference, scheduled for Spring 2005 - "Managing Our Nations Fisheries 2, a Focus on MSA Reauthorization". The agenda for the conference would depend upon the timing of MSA Reauthorsization. The conference is intended to be small, focusing on a few MSA Reauthorization issues, so there would be fewer, smaller panels than at the 2003 conference. Although scheduled for a year hence, it is important to nominate a very small dedicated organizing committee of Council and NMFS leadership and create a subcommittee to handle media and access to congressional members and their staff.

Six topic areas are suggested for consideration:

- Science vs Management

- Ecosystem Planning
- Rights-based Management Programs
- Resolving the Guiding Act for Fisheries Management - MSA or NEPA
- Best Available Information/Peer Review
- Other US Ocean Commission Recommendations

NOAA supports this conference and pledges financial assistance.

D. The Future of the Nation's Living Marine Resources and Ecosystem Approaches, October 18-21, 2004

This conference is proposed as a means of responding at a single venue to the issues raised at a series of constituent meetings held by Dr. Hogarth (detailed later). Four topics have been nominated for the conference:

1. Managing Fisheries, Managing Ecosystems
2. Angling for the Future - the Recreational Sector
3. Fishing for the Future - the Commercial Sector
4. Farming for the Future

This choice of topics reflects the issues which dominated the constituency meetings. It is proposed to have small panels of 4 to 6 people including a chair. There would be four daylong breakout sessions with the chairs and invited domestic and international speakers to brainstorm and develop papers. The meeting will be sited close to the White House and participation by legislators and politicians, up to and including the president is anticipated.

The final product will be plans. However, at this point in time it isn't clear who would adopt the plans. Some plans will be forwarded to Congress, others will be for federal action, perhaps in relation to MSA reauthorization, other plans may be destined for state level consideration.

Dr. Hogarth requested that the Council Chairs and Executive Directors suggest panelists and chairs for the meeting and also assist in writing the four papers noted above.

E. Remarks - The Honorable Wayne T Gilchrest,

Congressman Gilchrest stated that he supports the Council process, which is a democratic process depending upon diversity of thought, and a tolerance of differing opinions. The reauthorization of the MSA will be debated in the 109th Congress, and so the proposed Conference (See B above) in spring of 2005 is perfectly timed to inform Congress. The Pew Commission Report, parts of which are supported by many in Congress, will also be part of that debate, as will the Ocean Commission Report. The draft copy of the MSA reauthorization is considered a good working document, but it is simply the beginning - the final document will be different.

Funding is an issue within NOAA. NMFS should have the same funding status as NASA. As a member of the Science Committee, the Congressman believes that this is the time for a new national focus on the oceans rather than space, and the Ocean Commission will help to draw attention to marine issues. Currently there are many committees in the House of Representatives which deal with ocean issues. This fragmented approach makes it difficult to produce clean integrated legislation. Although it isn't in the Ocean Commissions Report, the Congressman is pushing for the creation of a Standing Ocean Committee in the House of Representatives.

The sort of topics under MSA that the proposed Standing Ocean Committee would be concerned with include: observers, definitions of overfishing, bycatch (fish and seabirds), essential fish habitat, habitat areas of particular concern, IFQs, overcapitalization and buy outs in different areas, (quality of) data collection for fishery management, ecosystem based management, violations of international conservation agreements. Some of these are long-term issues will be worked on a time frame of perhaps 5 or 6 years. The reauthorized MSA would recognize that these are long-term actions and the language of the reauthorization will reflect that view.

Congressman Gilchrest invited the Councils to provide comment, information and advice regarding MSA reauthorization at any time and, of course, when they next meet in Washington.

Congress wants to move forward with a cooperative research program - that will fully utilize fishermen knowledge together with science based research.

Councils were asked to delay implementation of any IFQ management actions whilst Congress was developing standards. Congressman Gilchrest would however welcome ideas from the Councils on IFQs.

Councils are also invited to offer suggestions regarding the application of IFQs in fishery management.

In conclusion the Congressman will do his best to visit each of the Councils before the National Fishery Conference scheduled for October 2004.

F. Ocean Commission Report

The Council Chairs and Executive Directors suggested that following the release of the Ocean Commission Report, the Councils develop press releases with a common theme, and provide regional examples of success stories.

G. Federal Advisory Committee Act (FACA): Proceedings for CCED meetings

Alice McKenna from the Department of Commerce outlined the FACA requirements and stated that she has concerns that the meeting may be subject to, but not in compliance with, these

requirements. She stated that meetings of individual Councils or their subcommitees were exempt from FACA under the MSA, but that because the Chairs and Executive Directors' meetings were supra-Council meetings that seek to provide recommendations directly to the government, they are not included in that exemption. She explained that recommendations from single Councils would be acceptable, but if the group discussed items and made consensus recommendations it would be more likely to be subject to FACA requirements. One solution proposed was the passage of legislation to exempt the Chairs and Executive Directors' meetings from FACA requirements. Based on sample text provided, the New England Council suggested that language limiting the group to no more than two meetings per year to be held at the request of the Secretary be softened.

Congressman Wayne T. Gilchrest indicated he would propose legislation to amend the Magnuson-Stevens Act that would exempt the Chairs and Executive Directors' meetings from FACA requirements. Both Mr. Gilchrest and Mr. Dave Whaley again invited and encouraged the Regional Councils to contact them with their concerns or questions.

H. Budget

The Pacific Council highlighted the growing gap between the increases in NMFS budget and Council base operating budgets. The current funding level does not cover the Councils' base operating expenses. Supplemental funds have been received to address new obligations, such as NEPA, Corals, Protected resources, etc. but an increase of about $6 million is needed to adequately support all of the Councils' base operations. Additional funding should continue to be provided for activities such as NEPA, coral reefs and protected species. Issues were also discussed regarding delays in receiving funds through Council grants and cooperative agreements.

Many of the attendees agreed with the Pacific Council's following comments about the Council budget:

- ***Funding for Councils needs to be increased to $21 million to cover basic administrative requirements and operational capabilities. New obligations placed on Councils need to come with additional funds.***

- ***Councils should be identified as a priority in NOAA's new planning and budgeting system.***

- ***NMFS should review the budget to identify budget line items associated with Council obligations where funds can be shared with Councils to support the additional $6 million.***

- ***The issue of Council base funding should be addressed at the upcoming budgeting and grants workshop, July 20 - 22, and Admiral Lautenbacher's staff should participate in this workshop.***

- ***The Council Executive Directors would like to review and comment on the draft agenda for the workshop.***

- ***NEPA funds should continue to be provided to Councils to meet NEPA requirements and support NEPA specialist staff positions.***

NMFS also reported on their new planning and budgeting program (PPBES). It was highlighted that this program is based on documentation of requirements, such as NMFS' stock assessment plan, bycatch plan and strategic plan. Councils were encouraged to draft similar planning documents as this will assist in documenting their financial requirements. Dr.Hogarth noted that the Western Pacific Council's Strategic Plan is an excellent example of such an approach. Dr. Hogarth suggested that NMFS work with the Councils to quickly identify and document their budget requirements in order to meet this summer's deadline for the 2007 budget. The New England Council noted that the need for documentation should not hold up requests for increases in base funding to cover existing costs- the need for which is already well known.

Dr. Hogarth stated that he will work to build the Councils into the budgeting process through the creation of 3-year plans. He also reported that he will look into what can be done to help the Councils with their 2005 and 2006 budgets.

Jack Dunnigan will have his staff determine a date for a working group to meet to work on the identification and documentation of 2007 budget requirements.

I. National Constituent Meetings: Continuing the Dialogue

Mary Katsuros reporting on the 2003 National Constituents' Meetings, said that the greatest accomplishment was a sense of true communication, without the restriction of a tight agenda. The output from the meetings is nine reports which are expected to be posted on the NOAA website shortly. There were thirteen meetings in total, involving over 1,200 people, of whom approximately 600 provided input. There was consensus among the participants on certain issues, including the need for more science, more observers, more cooperative research and better enforcement. An additional 15 issues were identified by constituents. One issue which was raised at every venue was that there was too much paperwork for fishermen to complete.

It was noted that constituents are good at identifying the main issues of the day, but do not usually know who is responsible, nor are they familiar with performance measures. The focus of most constituents was not long-range, but rather for a period of two to three years Location and timing are two crucial factors in a successful constituents meeting. For those constituents who are unable to attend the meetings, NOAA Fisheries established a website to allow electronic input. However sometimes the system was abused, for example by multiple submissions of identical text, purporting to come from 22 independent individuals.

In conclusion it is recommended that the constituent process should be institutionalized, and beyond organized formal and semi-formal meetings, it would be beneficial if lines of

communication could be maintained between various interested parties as a matter of routine. The Councils are considered the best venue for such informal dialogue.

J. Senator Inouye's remarks

Senator Inouye observed out that the various agencies involved in marine management need to find a balance between protecting and utilizing marine resources. Some groups are opposed to any use of natural resources and courtroom actions are of more interest than what is actually happening in the ocean. Others have a legitimate concern for their livelihoods. We can find a middle way - allow fishermen to make a living without depleting our natural resources.

New regulations allowing the re-opening of the swordfish long-line fishery demonstrate how fishing can go ahead whilst endangered seabirds and turtles are not placed at undue risk. These regulations were developed through the Council process, involving a variety of agencies and under public scrutiny. This is a model for successful fishery management.

The US fisheries account for about 2% of turtle takes worldwide. Federal agencies should take the example of US fishermen and conservationists to their international counterparts, and encourage other countries to take up similar measures to help reduce protected species bycatch. Tuna and turtles aren't restricted by political boundaries, they don't belong to any one country, and standards of resource use have to be adopted globally for the sake of future generations.

K. Enforcement:

1. US Coast Guard Report

Rear Admiral David Belz reported that the CG is committed to carrying out their mission of fisheries enforcement and that now, as opposed to the last couple years, more USCG resources and assets (e.g. high endurance cutters) could be dedicated towards fisheries enforcement due to the acquisition of assets (e.g. smaller patrol boats) better equipped for Homeland Security.

2. NOAA Fisheries Office of Law Enforcement

Dr. Hogarth gave an overview of the general OLE program in addition to reporting the various enforcement priorities for each region.

3. NOAA Fisheries VMS Policy

Dr. Hogarth reported that the VMS program is becoming stronger and getting more funding ($ 4 mil for FY04). He stated that there are 1607 vessels with VMS currently, with 500 more coming on line soon, and 3,000-5,000 vessels with VMS anticipated in 2-3 yrs. When asked about a National VMS Policy and the role of the Councils in helping developing that policy, he stated that collaboration between the Agency and the Councils would be beneficial.

Several Council Chairs and Executive Directors stated that NOAA OLE should consult with the Councils and industry when developing a National VMS Policy. Specifically, they requested that all Councils have the opportunity to review and submit comments on a draft national policy.

L. Management

L.1 Marine Protected Areas, National Sanctuaries and Coastal Zone Management NOS

Jamie Hawkins, Dan Basta and Joe Uravitch each made presentations which emphasized the transparency of the process of establishing protected areas, and indicated that they wanted to work as closely as possible with FMCs, especially in the area of crafting fishery regulations. There was however a concern that special interest groups were using the National MPA process and the Sanctuaries Act as a means of sidestepping MSA, with the ultimate goal of creating no-take MPAs for perpetuity. The Councils heard that the current strict MPA definition was under review and that de-facto MPAs including Department of Defense sites and areas protected for homeland security would be considered in any National MPA strategy and would be included in the inventory of Marine Managed Areas (MMA). The Fishery Management Councils (FMC) are invited to send staff as observers to the National MPA Advisory Committee meetings, the next being in Hawaii in September. Concerning the designation of new sanctuaries, the New England Council stated that the current 120 day time limit for Councils to write sanctuary regulations was unrealistic given the necessary analyses and public reviews. Dan Basta responded that he would waive that limit if more time was needed.

Dan Basta indicated he would write a letter to the Council Chairs and Executive Directors confirming that he has the statutory authority to waive the 120 day deadline.

Kitty Simonds asked for clarification of the Sanctuary policy in voting and non-voting membership of Reserve Advisory Councils(RAC) and Sanctuary Advisory Councils (SAC).

L.2 Ecosystem Based Management

Mike Sissenwine presented an update on NMFS Ecosystem-based Fisheries Management activities and noted that the concept of ecosystem based management essentially places emphasis on the inclusiveness of the approach or process rather than the end product. He stated that ecosystem approaches require consideration of items such as bycatch, trophic linkages as well as setting biological reference points in varying climatic regime changes. He also noted that many of the Councils are already incorporating ecosystem approaches in their FMPs.

Dr. Sissenwine reported that the more we study trophic linkages, the more complex it becomes to predict effects and changes and that long-term studies to monitor changes in productivity, need to be established, especially at lower trophic levels. Therefore, models based on this information will have to be developed so we can test various management options and identify which ones work the best under uncertainty.

He also stated that NMFS is working on developing technical guidelines for developing Fishery Ecosystem Plans as recommended by the NMFS Ecosystem Principles Advisory Committee in its 1999 report to Congress. He reported the draft guidelines will be completed within a few weeks and the next step will be to validate these guidelines thorough pilot projects. An important part of these guidelines will be to note that ecosystem-based management needs to be implemented incrementally as we learn more and gain new management tools.

Four Councils, New England, Mid Atlantic, South Atlantic and the Gulf are to receive finding in support of ecosystem based management.

Regarding Ecosystem-based Fisheries Management/Ecosystem Approaches, many Councils commented that:

1. ***NMFS should provide the Regional Fishery Management Councils with the draft Technical Guidelines for Developing Fishery Ecosystem Plans for review as soon as possible and consider Council input prior to finalizing the document.***

2. ***NMFS should provide adequate funding and resources to assist Regional Fishery Management Councils in compiling and synthesizing all available data (i.e. biological, oceanographic, physical and chemical) needed to begin developing FEPs, including development of models to test management options and identify those that may result in best outcomes under climatic uncertainties.***

L.3 National Standard 1

Paul Howard provided comments on the way NMFS is planning to amend the Guidelines for Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) National Standard 1 (NS1) (Overfishing/(Maximum Sustainable Yeild (MSY) Control Rule). This includes Stocks, Fisheries & Species Assemblages; Fishing Mortality Thresholds; Stock Size Thresholds; Rebuilding Stocks, OY Control Rules etc. The suggested changes were the result of a NMFS Working Group which met in 2003 to consider NS1 Guideline revisions.

One of the major changes to the NS1 guidelines will be more emphasis on controlling fishing mortality, treating the minimum stock size threshold more as a second line of defense. If new NS1 Guidelines are issued, existing rebuilding plans will be grandfathered in and that NMFS and the Council be given three years to complete necessary amendments for other aspects. The Working Group recommended clarifying and simplify the guidelines to allow each FMP to classify stocks into two categories: "core" stocks and stock "assemblages," and provide specific conditions for cases in which a mixed stock exemption may be applied to core stocks.

The Guidelines would have lower tolerance for overfishing - for example, by allowing phase-in periods to reduce fishing mortality to the MFMT only in cases where two specific conditions are met. At the same time, the Guidelines would be simplified to define the default MSST to be 0.5

B_{MSY}. Also, provide for specific cases in which an MSST or proxy need not be specified. The discontinuity in the current definition of maximum rebuilding time horizon would be removed. If T_{min} + one generation time exceeds 10 years, then $T_{max} = T_{min}$ + one generation time; otherwise T_{max} can be up to 10 years.

If inadequate data are available to estimate biomass-based reference points (e.g., B_{MSY} and MSST) reliably, the Guidelines would make it permissible to use appropriate fishing mortality proxies in certain situations. The Guidelines would provide procedures to follow when rebuilding plans require revision after initiation - for example, allow in certain situations the modification of either the sequence of rebuilding fishing mortalities or the time horizon, but not both. The Guidelines would also change the current language that OY control rules "may" be specified to say they "must" be specified.

NMFS will publish a proposed rule in the near future for comment. The Councils are asked to ensure they provide comments by July 1. It was also noted that outreach to fishermen about National Standard 1, and possible changes thereto, was extremely important.

L.4 Stock Assessments

The South Atlantic Council provided an overview of their South East Data Assessment and Review (SEDAR). SEDAR places emphasis on constituent participation and independent scientific review. Independent reviews were important to offset the problems of institutional bias where the same individuals were generating stock assessments. Problems could arise, however, if the peer review concluded that two conflicting scenarios were deemed to be feasible by the peer review. In such a case the model assumptions used in stock assessments need to be reviewed. The importance of the SSCs for reviewing stock assessments was noted by the meeting.

The SEDAR process might be used as a model for other Councils in conducting their stock assessments. The Western Pacific Council noted that the NMFS Honolulu needs additional funding to conduct stock assessments required in the Western Pacific Region.

L.5 Regulatory Streamlining: Multi-year versus Annual Actions, NEPA Umbrella etc

Jack Dunnigan discussed at length the process of regulatory streamlining and front loading being developed by NMFS to improve the rule-making and management process. He reviewed the June 8, 2004 strawman document including a 16-point procedural check-list. Mr. Dunnigan stated that because both the Councils and NMFS need analytical documents on which to base their decisions, it is important that available documents (whether FMPs or accompanying NEPA analyses) provide complete information on which to base these decisions. One objective of regulatory streamlining is to ensure that complete and defensible documentation is included in regulatory packages transmitted to NMFS for approval and implementation. Having NMFS input throughout the process is seen as one way to achieve this. One participant gave an example where two people looking at the same data could reach differing conclusions and asked what would happen in this situation - which viewpoint would go forward, or would the process have to

stop until agreement was reached? Mr. Dunnigan answered that the process would not have to stop but the Council would be fully informed of NMFS' perspective and could reconsider their action if they thought it appropriate to do so. Another participant commented that the document appears to centralize authority to NMFS' Headquarters (as in reality no Regional Administrator or regional General Council (GC) would sign off on advisory statements without approval from HQ). This would diminish the authority of the regions, which would be a real loss as they are the ones who understand local conditions and the history and logic behind Council actions. It would also result in special interest groups sending lobbyists to D.C. to intervene with HQ to influence decision making. Dr. Hogarth responded that because the MSA gives final authority to the Secretary of Commerce (delegated to Dr. Hogarth), HQ will always be lobbied. However HQ has delegated 99.9% of decision making to the regions and HQ (and the Department of Commerce) now rarely make changes to what is transmitted to them from the regions. He went on to say that the intent of regulatory streamlining is in fact to further move authority to the regions by ensuring that what is finally transmitted to HQ has been completely reviewed and will not encounter legal or political obstacles. This will be achieved by the involvement of HQ, NOAA GC and the Office of Management and Budget (OMB) early in the process. One participant responded that in the past NMFS' role has been to approve or disapprove, not to participate in plan development and that many creative management measures that were criticized by NMFS in their development stage have proven to be highly successful. Therefore procedures that would stifle this type of creative thinking would be inappropriate and detrimental to the management process and also contrary to the Councils' democratic and innovative process praised by Mr. Gilchrest in his remarks. A constructive tension between NMFS and the Councils is deliberately inherent in the MSA, and NMFS should not seek to overpower the Council's decision making process and activities. Other participants noted that the strawman document has an over-emphasis on NEPA when it is the MSA that is most relevant and applicable to fishery management. It was also noted that some Councils have received conflicting advice on NEPA analyses, especially on the number and range of alternatives to be analyzed. Although recent NEPA guidance seems to indicate that large numbers of alternatives are not necessary, some NOAA attorneys feel otherwise and have forced Councils to include non-viable and irrelevant alternatives. Dr. Hogarth commented that NEPA analyses of 1,000 pages seem overblown and that the Army Corp of Engineers seems to get by with 50 page analyses despite the fact that their projects often cause permanent destruction. In response to discussion of whether there are gaps between the two acts, Dr. Hogarth responded that NMFS is working on a comparison table to answer this question. Further discussion included the need for quick turn-arounds for management actions such as annual harvest specifications. Several participants commented that they would like the requirement for NMFS to sign off at critical control points to be revised to a requirement for NMFS to provide feedback rather than indicating approval or disapproval. Others stated that they would like to see timelines attached to these reviews (whether for approval or feedback) as it is sometimes difficult to get reviewers' attention on a timely basis. Concerning multi-year actions, Dr. Hogarth stated that he encourages multi-year regulations as they allow industry to better plan for the future.

Dr. Hogarth suggested that a working group be established with the Councils and NMFS to facilitate the implementation of the regulatory streamlining process. He also agreed to quickly

complete a matrix of NEPA and MSFCMA to identify the overlaps and gaps between the two statutes

Status: Conference call with representation from all the Councils on April 23, 2004. J. Dunnigan proposed implementing a pilot program in which each Council and Region would use the guidelines as a non-binding template and adapt them to their situation. He also agreed to edit the guidelines to indicate that the critical control points previously indicated as needing sign-off by NMFS can be used instead as feedback points (no NOAA sign-off required) if that is found to be appropriate by some Councils and Regions. His next step was to air this proposal at the April Leadership Meeting, and then to Dr Hogarth and Rebecca Lent. If they agree, he would then circulate the revised guidelines to the Councils and Regions for comment before their official adoption as an approximately one-year pilot project.

L.6 Essential Fish Habitat

Dan Furlong made a presentation on how the Essential Fish Habitat (EFH) mandate in the 1996 Sustainable Fisheries Act (SFA) and MSFCMA had been interpreted by NMFS in a way that seems to go beyond what the statute discussed. Rebecca Lent gave a short presentation on a proposed rule making for EFH, including the five year review of EFH implementation. The Mid-Atlantic Council commented that their EFH concerns are very different from those in other areas and that there should not be a "one size fits all" approach. Several other Councils commented that non-fishing impacts to EFH are much larger than fishing impacts and that this should be addressed. Rebecca Lent stated that NMFS is reviewing the documentation requirements for both NEPA and EFH reviews with the objective of providing complete yet concise documents.

The Mid-Atlantic Council asked NMFS to look at the EFH reviews and see how much of these are devoted to fishery versus non-fishery related impacts to EFH. NMFS asked the Councils to provide comments on the EFH proposed rule.

Status: Letter received from Rebecca Lent (to David Borden) on May 5, 2004 with copies to all Council Chairs and Executive Directors. Letter received from Bill Hogarth (to Roy Morioka) on May 5, 2004 with copies to the Regional Administrators. Forwarded by WPRFMC to all Council Chairs and Executive Directors on May 10 with a copy of the 'capacity letter' to Dr. Hogarth

L.7 Research

Paul Howard summarized the success of NMFS Cooperative Research Program in New England, and how this provided information required for fishery management. This success happened because they established a steering committee with broad participation including industry, scientists, Non-Government Organisations (NGO) and other stakeholders.

The Mid-Atlantic Council recommended that Councils use part of the Cooperative Research funds to establish a steering committee to advise NMFS on priority research areas.

The Gulf Council expressed dissatisfaction with a study conducted on charter vessels in the Gulf of Mexico, and had not received a satisfactory answer thereon from the author of the study, or from NMFS.
Dr. Hogarth indicated he had received a communication from the Gulf Council and would follow up on the concerns expressed therein about the charter vessel study.

L.8 Fish Consumption and Health Issues

John Kaneko and Paul Bartram reviewed health and safety issues associated with fish. These included histamine poisoning, ciguatera poisoning, and methyl mercury. The presentation was introduced with a discussion about Hazard Analysis Critical Control Point (HACCP) regulations, referring to a variety of capture methods, fish species, processing technologies and products. This large range of supply processes means that there is no single standard system of checking for safety, checking designs are custom designed, often depending upon local knowledge.

Some fish safety concerns are real, others are perceived. An example of a perceived concern was given, that of parasites in sashimi tuna. Prior to 1997 the FDA believed that fresh sashimi tuna harbored parasites which were significant in terms of public health. Following intensive research by Kaneko and Bartram, it was found that there was absolutely no evidence to support the FDAs belief regarding large tuna species. The FDA accepted the research and there is a new definition of tuna - separating the large and small tuna species. However even for smaller tuna - eg skipjack which are eaten around the Pacific, including Hawaii, there doesn't appear to be any evidence to support the FDAs position.

The biggest real issue in the region is histamine poisoning, caused by a certain type of bacterial spoilage of some fish species. It causes one of the commonest seafood-related illnesses in the USA. The Hawaii tuna industry is currently out of compliance with FDA guidance for histamine controls - this is because FDA inspectors say that Hawaii does not comply with either of two alternative approaches to control histamines better in the FDA guidelines. But the guidelines are not regulations even though the inspectors treat them as such. The FDA guidance is not practical, nor is it achievable in Hawaii. The guidelines depend upon knowing the time that the fish died, and freezing the fish to below 50 degrees within 6 hours of death. Operations on the longliners are usually on a 20 hour cycle, and it is not possible to bring down the core temperature of some of the larger species, eg a 600lb bluefin tuna in less than 24 hours. To mitigate against this problem Hawaii has developed it's own HACCP principles and conducted research to determine what constitutes safe handling.

There is a discrepancy in the way that foreign or import producers and US producers are treated regarding HACCP. Foreign imports, which represent 70% of the seafood supplied in the USA, are accompanied by a letter of assurance that a HACCP plan (provided) has been followed - a similar assurance from a US producer or fisherman will not be accepted by the FDA.

Scare stories are spreading in the media regarding the perceived risks of eating methylmercury contaminated fish. Inorganic mercury is present in the oceans, but there is little information on

how it is methylated in the open ocean. Much of what is known is gleaned from museum specimens of tuna and swordfish of up to 100 years ago, and these show similar levels of methylmercury to tuna and swordfish caught today.

Paul Bartram explained that recent notices appearing in the media are not regulations, they are advisories, which originate from the EPA, not to protect the average person, but rather, to protect fetuses and babies in the first 2 years when the brain is developing.

Research into the impacts of methylmercury in the diet is shown to be flawed, based on poor science related to ingestion of large amounts of pilot whale as opposed to routine consumption of fish. Other studied communities which routinely consume large amounts of fish including tuna - eg in the Seychelles, are not found to have the same symptoms demonstrated by the whale eating communities of the Faroes. Comparative studies of tuna tested in 1971 and in 1998 showed no increase in the levels of methylatedmercury in the tissues. Their hypothesis is that methylation of mercury occurs in the deep ocean, below 1000 metres, and changes would not be expected to be detected in tunas. It is noted that studies to date have not been co-variate, they have failed to bring in confounding factors, eg in the Seychelles, a new study is looking at the potential detoxifying effects of selenium on methylmercury. It is also noted that the very real benefits of a fish diet should be balanced against exposure to very low levels of methylmercury. For example omega-3 fatty acids are need by babies to allow their brains to develop properly.

When queries about reports of elevated levels of methylmercury in swordfish and albacore, it was explained that the levels are elevated only in respect to the reference dose derived from the flawed Faroes Island study. The would not be elevated if referenced against the more realistic Seychelles study.

Mr Morris indicated that he and Bill Hogarth have had discussions about how to promote the positive aspects of US fish products, especially from a human health perspective. Dr Hogarth continued by saying that they are in the process of signing MOUs with the FDA to get involved in more testing, especially imports. Doug DeMaster will work with the National Academy of Science to have their medical group assess fish as a whole, benefits and possible risks. Roger Berkowitz of Legal Seafood, a company on the east coast has set up a laboratory to test seafood sold to the market - this is intended to alleviate public concern.

Dan Furlong gave another example of inappropriate extrapolation by the FDA. Tilefish described as having high levels of methylmercury, but that was based on a study of a single incident in the Gulf of Mexico where high mercury levels were attributed to a slide of mud which was associated with oil rigs. The industry and the FDA have new studies demonstrating that levels have declined over the 25 years since the mud-slide, but the FDA has not changed its position.

Application of carbon monoxide and/or tasteless smoke treatment were discussed briefly. This treatment makes fish look fresher than it really is and so there are very real concerns for public health if old fish is misrepresented at the point of sale. However at this time, use of this

technique is expanding in the US, and has been extended to other species with a blood line that can be made to look red and fresh, eg swordfish.

Bill Hogarth reported that NMFS is finalizing a Memorandum of Understanding with the FDA to get more testing of fish. NMFS is also beginning a project with the National Academy of Science to examine both the benefits and hazards of seafood consumption.

L.9 Litigation - NOAA Fisheries

Sam Rauch reviewed the recent litigation against NMFS brought by the fishing industry and environmental groups concerning various fishery management measures. NMFS had won about 75% of the cases. However, some outstanding cases could have long term implications for the way NMFS interprets fishery management and related statutes. Rauch resisted the idea that cases should be separated out into procedural versus substantive losses in response to comments thereon by Council personnel. The only distinction on those grounds that he made was that the most common issue in the cases in 2003 was procedural notice and comment claims. He did not believe that a procedural loss was less serious because it is more easily cured. Some of the biggest and most controversial injunctions recently have been "procedural" losses for failure to conduct NEPA or to consult on the proper action, e.g., stellar sea lions and the closure of the Hawaii longline fishery. Any loss was a bad thing because it had the potential to take regulatory control away from the Councils and the Secretary.

Rauch mentioned three cases or issues to which NMFS and the Councils should pay close attention.

a) A 9th Circuit case on rebuilding time-frames (Natural Resources Defense Council versus Evans) where NMFS won in the district court and which NRDC has appealed. If the case is lost on appeal, it could have broad implications for how NMFS crafts rebuilding plans.

b) American Oceans Campaign versus Daley, the case challenging the EFH amendments of a number of FMPs around the country. NMFS won on Magnuson but lost on NEPA and entered into a consent decree to redo the NEPA analysis. As those EISs are finalized in the next year, NMFS can expect new substantive challenges to the EFH amendments.

c.) The rebuilding plans that NMFS is preparing for NE Multispecies and Pacific Groundfish. Both of these have been the subject of recent lawsuits. As the rebuilding plans are finalized, NMFS can expect new lawsuits.

L.10 Bycatch

Wayne Swingle gave a presentation on a national approach to standardized bycatch monitoring, as required under the Magnuson Act. He reviewed the various federal fisheries managed by the Councils, including the logbook reporting requirements and which fisheries were monitored by observer programs. He also presented an assessment of the various federally managed fisheries

and their "vulnerability" to bycatch of fish, marine mammals and other protected species. Bycatch management measures for demersal and pelagic longlines in the Gulf of Mexico were reviewed, which included the use of circle hooks and time/area closures.

Mr. Swingle also gave an overview of the cooperative gear research projects being conducted in the US by NMFS in partnership with the fishing industry. This included improving TEDs in shrimp trawls, finfish reduction in shrimp trawls and other trawls, pelagic longline-sea turtle mitigation, and reduction of habitat impacts of trawl gears.

Bobbi Walker gave a brief presentation of ongoing work on shrimp bycatch in the Gulf of Mexico shrimp trawl fishery. Apart from turtles, shrimp trawl bycatch also includes a substantial volume of fish. Over time the fishery has reduced the ratio of fish bycatch to shrimp from 10:1 to about 4:1. However, the trawl fishery continues to take juvenile red snapper, which are the focus of a rebuilding plan to recover this species from overfishing. Research was still ongoing to find an effective method that eliminated the bycatch of juvenile red snapper while retaining the shrimp catch.

Paul Dalzell reviewed the measures in place to monitor and reduce bycatch in the Western Pacific Region. He noted that the vast majority of fishing vessels in the Western Pacific were too small to accommodate observers and thus novel solutions were required, including high-tech electronic observers, or fishermen trained to be observers. Mr. Dalzell also indicated that bycatch in the Western Pacific had cultural dimensions, including preferences for fish and disposition towards live release, which was not well regarded by Pacific Islanders.

Councils commented that including incidental catch in the definition of bycatch would reduce clarity and lead to confusion as to what catches are undesirable. It is not undesirable to catch and utilize an incidental/non-target species from a healthy stock but it is undesirable to discard any fish. Jack Dunnigan commented that NMFS wants to take a broad approach to this subject in response to the Oceana petition on bycatch. Several Councils questioned whether it is NMFS' intention to reduce incidental catch and stated that a redefinition may lead to increased expectations by NGOs that this happens.

Dr. Hogarth stated that he will look again at the issue of redefining bycatch.

Status: Letter sent to Dr Hogarth.

Observers: Implications of National Policy upon Labor Standard Act

L.11 Latent Effort/Overcapacity

Dr. Hogarth reported that there have been problems when latent permits become active following buyouts to reduce capacity. He urged the Councils' to consider this, possibly by putting permits that have been inactive for 2-3 years on an "inactive" list. These permits would then be prohibited from being used until stock conditions improve. He went on to say that NMFS is

looking at legislation to get more funding for buybacks in 2005. He also suggested that more fisheries need limited entry programs (with or without IFQs) to control fishing capacity. Dr. Hogarth also mentioned that there is a GAO report that directs him to identify criteria for IFQs but that he feels the Councils should be the ones to do this. He has also received a number of other GAO reports on the budget, safety, enforcement, the need for less complex regulations and other issues to which he needs to respond. He suggests that these be discussed at the next meeting.

The Western Pacific Council asked several questions about NMFS' capacity estimation project. Dr. Hogarth responded that they are still working on the quantitative estimates and that there is no specific timeline, although there is money available and a lot of interest downtown. In response to a question about MSA reauthorization text directing NMFS to identify the top 20 fisheries with excess capacity, he stated that NMFS has identified the top 5 over-capitalized fisheries and will send that to the group. Regarding recreational fisheries, Dr. Hogarth stated that NMFS is no longer looking at capacity control but will instead continue to rely on traditional measures such as size and bag limits.

Dr. Hogarth recommended that a small working group be established to examine this issue.

Status: Letter sent to Dr Hogarth.

L.12 International Issues

Paul Dalzell reviewed issues of concern to the Councils regarding international fishery management. There were some clarifications made about responsibilities for Pacific halibut management through the International Pacific Halibut Commission, which conducts stock assessments and establishes quotas for Canada and the US. The North Pacific Council allocates the US quota among US fisheries.

In the Caribbean, there is also a fishery treaty between the US and United Kingdom concerning fishery resources shared between the US and British Virgin Islands.

Bill Hogarth mentioned that there will be a Congressional hearing on international fishery management, concerned primarily with bycatch.

L.13 Protected Resources

Paul Dalzell reviewed issues relating to protected species management by the Councils. Rebecca Lent noted that the sign off on Section 7 consultations was now delegated to the Regional Administrators. Lent also added that Council representatives were also involved in the take on each take reduction team for marine mammals. She added that with respect to the MMPA List of Fisheries and the Hawaii longline fishery, there would be a workshop in the near future about this issue. Lent asked the Councils to send in comments in on the proposed list of fisheries.

Bill Hogarth reported that NMFS is preparing an aquaculture business plan which will cover offshore aquaculture. This will be circulated to the Councils for comment, and Dr Hogarth will also provide the Councils with copies of the proposed legislation on aquaculture.

M. Summary of Meeting

Meeting participants expressed general enthusiasm and support for the meeting and associated events and thanked the chair, executive director, and staff for their hospitality and hard work. The North Pacific Council stated that Kitty is our *kumu*, and a *nani wahine*, and said *mahalo nui loa.*

N. Next meeting

The Pacific Council will host next year's meeting and anticipate it being held at Dana Point, in the last two weeks of April. The New England Council suggested that the meeting format be revised to allow more substantive discussions of problems and solutions. Specifically, it was suggested that the number or length of informational presentations be reduced, and an ending day be added for determining specific actions to be taken, tasking of assignments to groups, and setting timelines for completion of tasks.

O. Other business

The North Pacific Council reported that they will soon be distributing the proceedings of this year's National Council Conference and they will also make it available on their website and in libraries. They are continuing to seek other venues for its roll-out that will attract attention. They will also create and distribute a template press release to be customized and released by each Council. The next step is to determine a tentative date for next year's meeting.

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Ad
NATIONAL OCEAN SERVICE

Ms. Stephanie Madsen
Chair
North Pacific Regional Fishery Management Council
Pacific Seafood Processors Association
222 Seward Street, Suite 200
Juneau, Alaska 99801

Dear Ms. Madsen:

I want to thank you once again for having me at the Fishery Management Council Chairs and Executive Directors meeting. It was a privilege to be there with you. I found this not only productive but educational as well. Most important to me was being able to network with Council members and staffs, and continue to share the National Marine Sanctuary Program (NMSP) story.

There were three items that stood out from a number of our excellent discussions to which I wanted to respond. The first was a discussion of the 120-day period (as specified by NMSP regulations at CFR §922.22) during which Fishery Management Councils (FMCs) must respond (if they choose to respond) during a formal coordination process as specified by Section 304(a)(5) of the National Marine Sanctuaries Act (NMSA). Under this section, FMCs are provided the opportunity to draft fishing regulations for a sanctuary. As I understand it, the concern is that the 120-day period is an inadequate amount of time to undertake such a task.

In past practice, we have found that the 120-day limit is sometimes exceeded, in situations where the NMSP and the specific FMC were actively cooperating on preparing draft regulations. We are currently investigating this limitation as part of a general review of program regulations that we have recently initiated; however, we believe that some reasonable time limit is necessary to define language contained in Section 304(a)(5) directing the draft regulations should be prepared in a "timely manner." The current time limit ensures that the process keeps moving along, while allowing a reasonable time for the 304(a)(5) process to be completed.

The second item was a discussion of the role of FMCs on Sanctuary Advisory Councils as either voting or non-voting members. It is the general policy of the NMSP to provide extensive latitude to Sanctuary Managers in determining the composition of their Advisory Councils, including whether or not certain seats should be included and whether those government or FMC seats are either voting or non-voting. Several of the older Advisory Councils (including that for the Hawaiian Islands Humpback Whale National Marine Sanctuary) have government and FMC seats as voting members; most of the newer Advisory Councils (including the Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve) also include government seats, but normally as non-voting members. This pattern has arisen for the following reasons: (1) numerous government agencies are normally represented by someone who is not in a position to vote and prefer to do agency-to-agency business through more traditional governmental channels; and (2) since newer Advisory Councils are subject to a fifteen-member limit (by the NMSA), which we have interpreted to be fifteen voting seats, having governmental seats as non-voting allows the sanctuary to maximize the number of non-governmental seats while still having the agency partners at the table. Since the older Advisory Councils are accustomed to operating in a certain fashion and since we continue to provide much discretion to each Sanctuary Manager, there has not been an across the board effort (either on the part of the individual sanctuaries or the NMSP as a whole) into turn their voting government seats to nonvoting seats. However, as we prepare for the reauthorization of the NMSA, we are considering various options that may address the fifteen-member limit while still allowing us to keep the Advisory Councils to a reasonable size.

The third item is coordination between the FMCs and the NMSP. As I indicated at the meeting, I believe that the most effective way for the FMCs and the NMSP to integrate their goals and purposes is with early and frequent coordination between our staffs. It is important that the NMSP begins to work with the FMCs early, often, and continuously in the development of Fishery Management Plans that may impact important sanctuary resources so that NMSP concerns can be integrated into the Fishery Management Plans. Likewise, the FMCs need to be involved early in the management plan review process so that their views can be considered as management approaches and regulations are developed by the NMSP.

In closing, let me repeat what I said at the meeting in Hawaii: I am firmly committed to improving our working relationship with NOAA Fisheries and with the FMCs. Such an effort will continue to take time and have its ups and downs, but if we can persevere, we will find a common ground. I look forward to continuing that effort.

Sincerely,

Daniel J. Basta
Director
National Marine Sanctuary Program

cc: Chris Oliver, North Pacific FMC Executive Director
Bob Lohn, NW Regional Administrator, NMFS
Rebecca Lent, Deputy Assistant Administrator, NMFS

INSTRUCTIONS FOR COMMENTS

Please follow these instructions for preparing and submitting your review comments. The format below will facilitate the processing of reviewer comments and assure that your comments are appropriately considered. Please provide background information about yourself on the first page of your comments: your name(s), organization(s), area(s) of expertise, mailing address(es), telephone and fax numbers, email address(es). Overview comments on the section should follow your background information and should be numbered. Comments that are specific to particular pages, paragraphs or lines of the section should follow your overview comments and should identify the page numbers to which they apply. Please number all your pages, (on the upper right hand of each page,) and have your identifying information at the top of each page.

DATES: Comments on this draft document must be submitted by [30 days from the date of report publication.]

The public comment period will end June 25, 2004.

AND

All comments SHOULD be sent electronically to:

research.review@noaa.gov,

or mail them to:

NOAA Research, Science Advisory Board,
c/o Ms. M.Whitcomb,
Silver Spring Metro Center Bldg 3
Room 11558,
1315 East-West Highway,
Silver Spring, Maryland 20910.

If further Information is needed, please contact: Ms. M. Whitcomb (phone number 301- 713-2454 x 173), during normal business hours of 9 AM to 5 PM Eastern Time, Monday through Friday.

DRAFT
NOAA Research Review Team

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May 26, 2004

DO NOT QUOTE

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Preface

The National Oceanic and Atmospheric Administration (NOAA) was created to serve a national need to better protect life and property from natural hazards, to better understand the total environment, and to explore and develop ways we can wisely use our marine resources. NOAA needs research to develop products and services that protect life and property and promote sustainable economic growth.

The FY 2004 House and Senate Appropriations Committee Reports contain language that challenged explicitly the organization of research in NOAA's primary research office and implicitly raised the issue of how should research best serve NOAA and the nation.

In response to these Congressional concerns, NOAA asked its Science Advisory Board (SAB) to establish a Research Review Team with the broad task of providing findings and recommendations for NOAA to use to enhance its research organization and connection to operational activities.

In this Report, we have sought to do this by establishing operational and organizational principles for guiding research, by providing findings and recommendations to enhance NOAA's research organization and connectivity to operational activities, and by answering the specific Charge of the SAB.

NOAA serves the American public, the nation, and the world with the highest possible distinction as a *trusted* information agency. Significant portions of the research enterprise are internationally recognized as world-class, and the work is of extraordinary value to the country.

However, to meet the new and increasingly complex demands and challenges, including those posed by the Climate Change Science Program, the Global Earth Observing System of Systems, and the preliminary report of the U.S. Commission on Ocean Policy, NOAA must embrace changes in its operational procedures and organizational structure; these changes are in the best interests of NOAA, its research enterprise, and our country. We see evidence that changes for the better are beginning to take hold in NOAA, and we urge the agency to continue down this path, using this Report as a helpful guide.

In change there is opportunity.

I. Introduction

On October 3, 1970, the National Oceanic and Atmospheric Administration (NOAA) was created and incorporated into the Department of Commerce (DoC) to serve a national need "...for better protection of life and property from natural hazards...for a better understanding of the total environment...[and] for exploration and development leading to the intelligent use of our marine resources." Research is essential to NOAA's development of products and services that protect life and property and promote sustainable economic growth. A focal point for NOAA research is the Office of Oceanic and Atmospheric Research (OAR), one of six NOAA line offices.

The FY 2004 House and Senate Appropriations Committee Reports contain language specific to NOAA research in OAR, and this language is included by reference in the Conference Report accompanying the Consolidated Appropriations Bill. The House Report accompanying the FY 2004 Commerce, Justice, State, and Judiciary, and related Agencies Appropriations Bill directs NOAA to develop a laboratory consolidation plan: "In recognition of current resource limitations the Committee is forced to operate within, the Committee directs NOAA to review the continued requirements for twelve separate laboratories, six of which are located in Boulder, Colorado. The Committee directs NOAA to submit a laboratory consolidation plan to the Committee by March 15, 2004." The Senate Report accompanying the FY 2004 Appropriations Commerce, Justice, State, and Judiciary, and related Agencies Appropriations Bill states, in part: "NOAA is directed to report to the Committee on Appropriations on the costs and benefits of breaking OAR up into its constituent parts and distributing those parts as desirable to the other line offices. The report should specifically address how the newly configured research sector will directly assist line offices in developing timely solutions to problems confronting NOAA now and in the next 5 years."

In response to these Congressional directives, NOAA asked its Science Advisory Board (SAB) to establish a Research Review Team (Appendix 1) to address five primary issues:

- Does the research conducted by the Office of Oceanic and Atmospheric Research provide effective support and vision for NOAA by enabling it to improve products and services, and to introduce new products and services through the transfer of technology and the development and application of scientific understanding?
- Is OAR adequately linked to NOAA's operational line offices- National Weather Service (NWS), National Environmental Satellite Data and Information Service (NESDIS), National Marine Fisheries Service (NMFS) and National Ocean Service (NOS)- and are the research programs relevant to the needs of these organizations? If so, what are the benefits? If not, what changes would the Review Team recommend? Is it adequately connected to the Program Planning and Integration Office?
- How do the management structure and processes of OAR compare to those of other agencies managing research? Based on that analysis, should OAR be dissolved into its constituent

components and distributed across NOAA, should it be left as is, or should NOAA consolidate all of its research activities into a single organization?

- Focusing specifically on the OAR labs, would consolidation of the labs yield a more effective scientific program? If so, what would the Team recommend?
- Would lab consolidation yield a more efficient structure, by reducing administrative overhead and infrastructure/manpower? If so, what would the Team recommend?

The broad task to the NOAA Research Review Team is to conduct a review of OAR "for the purpose of improving the effectiveness and efficiency of its research enterprise. The review will provide findings and recommendations that will be used by NOAA to enhance its research organization and connectivity to operational activities."[1] Additionally, the Review Team's recommendations are intended to assist NOAA in responding to the Senate and House language. It was in that spirit that the Review Team prepared and released on January 29, 2004, *A Preliminary Report*; this document subsumes that *Preliminary Report*. More broadly, the Review Team believes that to respond logically to the Charge of the SAB that it is essential that we consider the research enterprise at NOAA and not just focus upon OAR. In honoring this expanded perspective, we also acknowledge that in the time available we have not been able to focus as much attention on many of the specific issues in the other line organizations; however, we are making recommendations that go beyond just OAR and pertain to NOAA science and research structure as a whole. In this regard, we hope that this Report contributes to the wider ongoing discussion about the management and organization and role of science and research.

We also have taken into consideration three items that directly impact the research program of NOAA: the Climate Change Science Program, the Global Earth Observing System of Systems framework, and the recently released Preliminary Report of the U.S. Commission on Ocean Policy.

The Climate Change Science Program (CCSP) Strategic Plan, prepared by 13 federal agencies as a multi-agency collaboration, addresses global climate variability and change. The CCSP incorporates the near-term deliverables of the Administration's Climate Change Research Initiative, and the long-term breadth of the U.S. Global Change Research Program authorized by the Global Change Research Act of 1990. NOAA is the lead or co-lead for 19 of the 21 CCSP deliverables. CCSP identified goals to address how climate variability and change will affect the environment and our way of life and to assess how we can use this knowledge to protect the environment and provide a better living standard for all:

1. Improve knowledge of the Earth's past and present climate and environment, including its natural variability, and improve understanding of the causes of observed variability and change.

[1] Letter from Vice Admiral Conrad C. Lautenbacher, NOAA Administrator, to Dr. Leonard J. Pietrafesa, chair NOAA Science Advisory Board, October 6, 2003

2. Improve quantification of the forces bringing about changes in the Earth's climate and related systems.
3. Reduce uncertainty in projections of how the Earth's climate and related systems may change in the future.
4. Understand the sensitivity and adaptability of different natural and managed ecosystems to climate and related global changes.
5. Explore the uses and identify the limits of evolving knowledge to manage risks and opportunities related to climate variability and change.

The CCSP goals must be an integral part of the climate portion of the NOAA Research Vision and Plan. Moreover, they will take many years to accomplish as NOAA works collaboratively with its federal partners. Concurrently, NOAA recently established a matrix management system to improve coordination and efficiently use resources for programs, such as climate, that span two or more NOAA line offices. The matrix management approach to climate ensures that there will be a focused program that fulfils NOAA's commitments to the implementation of the CCSP.

Global Earth Observing System of Systems (GEOSS) will develop a pioneering global architecture that will, over the next decade, revolutionize the understanding of how Earth works and enable development of advanced forecast and assessment models to advance informed decision making on national, regional, and local levels. NOAA plays a critical role in constructing the GEOSS international initiative, and consequently, NOAA's research enterprise must be advanced in conjunction with developments in Earth observations. In particular, the goal of GEOSS to take the "pulse of the planet" will require integration not only across observing systems but also across the research enterprise that will both formulate the needs for these measurements and use them to advance understanding and prediction. Observations of the evolving physical, chemical, and biological state of Earth will place new demands on the organization of NOAA research (for example, in the development of advanced data assimilation techniques) so that NOAA can take proper advantage of GEOSS. Traditional disciplinary research will not suffice, and NOAA will need to ensure that its research efforts have the required breadth and co-ordination to match GEOSS.

The U.S. Commission on Ocean Policy preliminary report contains several recommendations that are of critical importance to the future direction for NOAA's research. Relevant priority recommendations from the Commission's Preliminary Report (Appendix II) include:

1. Congress should pass an organic act for NOAA, codifying its mission, functions, and structure, consistent with the principles of ecosystem-based management and with NOAA's primary functions of assessment, prediction, and operations; resource management; and research and education;
2. The federal budget for ocean-related research should double over the next five years;
3. Expand specific programs within NOAA that directly relate to the research enterprise; and

4. NOAA should assume a leadership role for the Integrated Ocean Observing System.

The Commission's recommendation to double the federal research budget for ocean-related science adds urgency and emphasis to the Review Team's call for a comprehensive research plan for NOAA and a senior management team to manage this research enterprise. Of critical importance as the federal ocean science budget grows is NOAA's responsibility to properly integrate intramural and extramural research to maximize this investment. We discuss the intramural and extramural research in NOAA in subsequent sections of this report.

The creation of an organic act must include the clear recognition of NOAA as a science-based agency with a corporate view of the research program. The Ocean Policy Commission recommendation for restructuring along functional lines is also supported by the Review Team. The Review Team proposes several means of integrating the research activities across line offices as the first stage of a possible restructuring process. Our principles for the research organization (Section II) offer a guide for future restructuring efforts. The expansion of programs such as ocean exploration, ocean mapping, aquaculture, preventing the spread of invasive species, and oceans and human health, and the leadership of an integrated ocean observing program should be considered as critical building blocks for the future development of NOAA's ocean-related research program. In addition, the Commission's recommended consolidation of currently fragmented programs across all federal agencies, including NOAA, will challenge the agency to ensure that the science and research support for these activities can be maintained within NOAA and its external partners. Examples include: habitat protection and restoration, protected area management, and marine mammal and protected species programs.

It is the Review Team's view that research in NOAA, and particularly the role of OAR, is a vital cornerstone of NOAA's mission that includes research-to-customer interactions. On topics that range from ozone depletion, air quality and weather prediction, and climate variability and change to global water resources, coastal dynamics and ecosystems management, NOAA has served the American public, the nation, and the world with the highest possible distinction as a *trusted* information agency. Significant portions of the research enterprise are internationally recognized as world-class, and the work is of extraordinary value to the country. It is the hope of this Research Review Team that in addressing its assigned tasks, we are challenging NOAA constructively to do even more to enhance its research enterprise.

The Findings and Recommendations in this Report are based on examining substantial amounts of data and various reports, as well as extensive internal NOAA interviews, including: focused and repeated discussions with the OAR Laboratory Directors; meetings with Assistant Administrators of NOAA's line offices, Goal Team leads, and other senior NOAA staff; meetings with senior managers (past and present) of other governmental agencies and large private sector, research-based companies; wide-ranging discussions with representatives of NOAA's external community (including Joint Institutes); and discussions with the SAB (Appendix III).

We sought collaborating comments and data for our findings, but these findings are the product of both analysis and synthesis, and they are, of necessity, partly subjective. In making recommendations, our approach was to compare specific recommendations to the guiding principles and to remind ourselves of the physician's oath of "First, do no harm"; we have tried to honor this. We have consciously sought to provide latitude as appropriate in our recommendations, but this latitude does not include the *status quo*. We believe that it is appropriate to identify options and constructive opportunities for change, from which NOAA leadership can select the most appropriate solutions. We do believe that there are changes needed, and these changes are in the best interests of NOAA, its research enterprise, and our country.

The Research Review Team expresses its appreciation to the many individuals who contributed their energy, time, and wisdom to this enterprise; we are particularly grateful to the NOAA employees, who willingly and openly shared their thoughts with us. Throughout this study we have enjoyed and benefited from the support of the NOAA leadership at all levels, and for this support we express our appreciation. Finally, the team is particularly grateful to Ms. Mary Anne Whitcomb and Ms. Tracey McCray for service beyond the call of duty.

II. Principles

NOAA is a science-based agency with regulatory, operational, and information service responsibilities. To fulfill these responsibilities, it is essential that NOAA maintain a vigorous and forward-looking research enterprise. Given the vital importance of research to the agency, it is perhaps not surprising to discover that research has spread across NOAA; there are 29 somewhat heterogeneous NOAA Laboratories and Centers and 18 Joint Institutes associated with research in NOAA (Appendix IV). Because such complexity can work to the disadvantage of NOAA's mission, the Review Team believes there needs to be a set of principles to guide recommendations focused upon ensuring research excellence, to invigorate the program to transfer research into operations and information services, to ensure that the best research is the basis for scientific advice for regulatory responsibilities, and enhance NOAA's information services. The following principles are consistent with the successful research programs in support of operational requirements that we reviewed outside of NOAA (Appendix III).

Operational Principles for Guiding Research Focus

Value and Quality

- A sustained research program is essential for a science-based agency with long-term operational responsibilities.
- Research in support of the organization's mission should cover a spectrum of temporal frames: e.g., short-term time frame (<2 years), mid-term time frame (2-5 years), and long-term time frame (>5 years). A Research Plan with milestones is necessary to ensure continuity across this spectrum.
- A culture of risk tolerance commensurate with a robust investment in long-term research with potentially high programmatic payoff must be established and maintained. A quantifiable and consistent level of resources must be dedicated to research that may not have a near-term operational application but provides the cutting-edge solutions for the future.
- Extramural research is essential to a science-based agency to broaden and deepen the scientific enterprise on which it depends while maintaining cost effectiveness and flexibility.
- The research program must be an open, merit-based process that brings together intramural and extramural efforts to contribute to problem solving. Extramural partners must be full participants in the program. The infrastructure supporting extramural research, including the administration of grants and contracts, needs to encourage and facilitate their participation in contributing toward the research objectives of the agency.
- Trust in and respect for the integrity of the research planning process is essential. The resulting budget should be simple, transparent, and provide maximum flexibility for

budget planning and execution. Fragmentation of the budget into a large number of line items is an impediment to continuity and flexibility in the research program.

Relevance and Focus

- Research priorities must be consistent with the overall mission and goals of the organization, and the strategy for ensuring that consistency must be explicit. These priorities must be formally expressed in an enterprise-wide Research Plan. This plan should explicitly consider whether particular efforts should be developed within the agency and/or extramurally.
- Research responsibilities include identification, in collaboration with operational lines, of relevant operational requirements, including regulatory responsibilities, and efficient transition of research into operations and information products. This responsibility includes ensuring that the scientific advice for resource management and regulation is of the highest quality and uses the most current research.
- Research planning and investment must be agency-wide. This research investment must be reviewed and verified by the agency periodically to make sure that the research supports the mission. This process should sustain research, ensure transition from research to operations, and identify research that is no longer applicable to the mission.
- In-house scientific expertise must be fostered, over the long-term, in those recognized areas where a science-based agency has a major mission-related responsibility. Those areas should be defined by the core mission foci of the agency, including emerging aspects of these missions. A science-based agency must be able to lead national and international research and assessment efforts through intramural and extramural programs.
- To the extent possible, budgeting and funding streams for the research program must guarantee continuity with flexibility. Both intramural science and research and extramural programs are necessarily multi-year efforts, and multi-year funding must be planned for with reasonable certainty, including both base funds and project funds. Budgeting should be based on the research plan as far as possible.

It is important to ensure that the research programs respond directly to the other mission activities. For developmental and longer-term objectives, it is important to ensure that the ability to undertake higher risk research that may not have a near-term application is not compromised by immediate operational needs. Similarly, it is imperative that the products of NOAA's research, be they operational advancements or expanded information services, reach the user. These Operational Principles are necessary to make certain these capabilities thrive across the spectrum of research, but they are not sufficient; there must be a corresponding set of Organizational Principles.

Organizational Principles for Guiding Research Location and Management

- The overall research enterprise should be viewed as a corporate program. Explicit linkages between research efforts across organizational lines must be forged and maintained for the agency and the nation to obtain the full benefit from research.
- There must be a single point of accountability for all science and research and this must be at the highest levels of the organization. This must be a primary responsibility, not a collateral duty.
- Formal mechanisms that clearly define responsibilities for transitioning research into operations, including the commitment of resources, must be agreed to and understood throughout the agency.
- Organization must follow function; therefore, if the transition of research into scientific advice, operations, services, and information is to be successful, then this function must be reflected clearly in the organization and in its processes.
- Dedicated resources for research that is focused on mid- to longer-term mission needs are essential. Locating these resources for intramural and extramural research in a research line can ensure these needs are not subsumed by shorter-term operational demands.
- Research that addresses near-term improvements to current operational capabilities should be formally aligned with the operational activity.
- Scientific advice including that needed to meet operational resource management requirements should be formally aligned to the corporate research program to ensure that policy is based on the best available science.
- The structure of the organization should foster not only intra-agency but also inter-agency collaboration in the research enterprise.

These principles are consistent with the need of moving NOAA from an amalgamation of separate line offices to becoming a single focused entity—in business terms, NOAA needs to move from being a "holding company" to becoming a "corporation." We note that in most successful technologically advanced governmental agencies, corporations, and research universities, the research function reports to the "front office," budget structure formally recognizes a spectrum of research, and for corporations and agencies, there is almost always a corporate plan for research. Universities may not have a formal research plan, but generally, there are stated research priorities in their strategic plans.

For example, the budget structure within the Department of Defense (DoD) formalizes management of research across a gradient of operational maturity (e.g., its 6.1 – 6.7 structure Appendix V), and importantly, this structure and process codifies roles and responsibilities in the transition of research to operations, including transition criteria during formal research progress reviews. The DOD 7-level system can be modified to meet more appropriately the needs of NOAA, but at the least, the DoD rules and criteria for transitioning from research dollars to operational dollars offer an additional example and perhaps a useful framework. In this same

vein, in 1995 the National Aeronautics and Space Administration (NASA) initially proposed Technology Readiness Levels (TRLs; Appendix V.A), and the US DoD adopted TRLs in June 2001 where they are now mandated for all major acquisition programs. Again, the use of TRLs could prove particularly helpful in the transition of research to specific operational products.
From a slightly broader perspective and one that complements the Operational and Organizational Principles set forth above, Dr. Mal O'Neill, Chief Technical Officer, Lockheed-Martin Corporation, presented the following set of guiding principles:

- Customer pull must be accommodated early;
- R & D staff must advocate technology transition and focus on customer mission success;
- Observing Best Practices and Lessons Learned will optimize R&D investments;
- Large, diverse organizations must horizontally integrate R&D and leverage external R&D, and
- Like other corporate functions, R&D must have an accountable focal point.

Finally, while plans and processes are important, people are vital. Science and research after all are uniquely human endeavors. Leadership in scientific research is particularly difficult: herding butterflies is one analogy; a hockey referee is another. But whatever science leadership is, it is clear that it is important. Scientific distinction only comes when the leaders are people whom other scientists want to follow. At the research laboratory level, this implies that genuine leadership is, almost always, by outstanding scientists; this is central to laboratory leadership and integral to the success of any research institution. Fortunately, it is demonstrably possible to find within NOAA outstanding scientists who have the genuine scientific respect of their staff, and who also can and are willing to manage. This has implications for our subsequent recommendations.

III. Findings and Recommendations

Our strategy for establishing findings and making recommendations was to conduct extensive discussions (Appendix III) and to examine a wide variety of quantitative data. These data are available at http://review.oar.noaa.gov/.

In establishing Findings and in making Recommendations, the Review Team notes that our recommendations are not exhaustive. We focused our attention on the most important areas for change. We suggest directions that NOAA should take to improve an already distinguished research enterprise. Our recommendations should be viewed as a guide to NOAA management and researchers on ways to improve their programs. The Review Team sought to strike a balance in the level of detail of our recommendations. We leave implementation to NOAA, but hope these findings and recommendations give strategic direction.

Research Plan and NOAA's Mission

Finding: The NOAA Strategic Plan is a valuable guide for the future of the agency that identifies six crosscutting priorities that are essential for NOAA to meet its mission responsibilities. One of these priorities is *Sound, State-of-the-Art Research.* A core activity is NOAA's recently instituted Planning, Programming, Budgeting, and Execution System (PPBES), which could help in developing timely solutions to problems facing NOAA now and in the next five years. It was not as clear if sufficient resources have been devoted to the ongoing development and maintenance of the PPBES system. We find, moreover, that there is neither a research strategy nor a research plan to support the Strategic Plan. We also find that this lack contributes significantly to a severe *communication problem* between NOAA (and particularly OAR) and Congress, the Office of Management and Budget, and the external community. It also contributes to an internal communication problem regarding research priorities and objectives and linkages between the line offices or even within a line office. In addition, absent a longer-term research vision, the current focus on relatively short timescales (less than 5 years) in the PPBES process will undermine NOAA's future operational and informational services capabilities.

Recommendation: NOAA should develop a Vision for Research that supports the Strategic Plan. The Vision and Strategic Plan should extend outward to 20 years. The Research Vision should provide broad guidance and directions. NOAA should also develop a NOAA-wide Research Plan that provides explicit guidance including specific programmatic actions, performance measures, and milestones for implementing the Research Vision. The initial Research Plan should be based upon the direction of the current Strategic Plan and the initial Research Vision, and it should be the basis for developing goal-specific plans. Importantly, as a "corporate" research plan it should not be a collection of the plans for each line office, but rather a coherent integrated vision for NOAA's research efforts as an entity.

The Plan should clearly articulate the research goals and projects for the next 5 years in a phased approach. Potential outcomes and payoffs, which link the research enterprise to the broad NOAA mission, should also be articulated. It should provide a blueprint that would indicate how the laboratories, Joint Institutes, Cooperative Institutes, Joint Centers and the broad extramural community are going to deliver on the Research Plan.

Consequently, the Research Plan should be developed in close consultation with the external community; however, the initial version will need to be fast-tracked so that it can help shape the FY 05 budgetary actions. Given that this Plan must be evolutionary in nature, there will be the opportunity for a greater role for the external community in shaping subsequent versions of both the Strategic Plan and the Research Plan. We are pleased that following our Recommendation in our Preliminary Report, NOAA has produced an initial Draft 5-year Research Plan, and we also applaud NOAA for charging its Research Council to prepare a 20-year Vision for Research. Subsequent versions of the Research Plan and Vision will require commitment not only from NOAA scientists but also NOAA's research partners.

In this regard, the Research Plan as it evolves must also build upon the appropriate National Research Council reports and consider international research plans. NOAA has already demonstrated sensitivity to and support of important international research initiatives including:

- Global Energy and Water Cycle Experiment (http://www.gewex.org);
- Joint Global Ocean Flux Study (http://www.uib.no/jgofs/jgofs.html);
- World Ocean Circulation Experiment (http://woce.nodc.noaa.gov), and
- Global Ocean Ecosystem Dynamics (http://www.pml.ac.uk/globec/main.htm).

To implement, monitor, and update the plan, the PPBES system needs to be fully used with appropriate support on an ongoing basis. Finally, review of the NOAA Research Plan is essential, both internally and externally, both nationally and internationally, and through periodic assessments of the Plan.

Research Organization within NOAA

Finding: NOAA needs a stronger and more coherent research management structure to execute a NOAA-wide Research Plan. The NOAA Research Council can play a vital role in defining NOAA's research mission. The role of the OAR Assistant Administrator, as its Chair of the Council, could provide senior management important control over the needed Research Vision and associated Research Plan. We recognize that the terms of reference for the Research Council state that the purpose of the Council is to provide "corporate oversight" and its mission is "to ensure that all NOAA research programs are consistent with the NOAA Mission, and NOAA Strategic Plan" Among the Council's roles and responsibilities are to "establish criteria and develop processes for reviews of all research and development programs..." and to "ensure appropriate mechanisms are in place to facilitate transfer of information and transition of

research to operational use." We further recognize that the Council structure has been designed by NOAA to provide corporate-wide oversight, whether it is research, observations, or oceans. The Councils are still growing into their roles, and we concur that their presence attests to NOAA's recognition of the need for a corporate perspective.

Despite the Council's roles and responsibilities, we believe that there needs to be higher-level budgetary and programmatic oversight for all research in NOAA. Furthermore, there is ample evidence that NOAA as a whole has suffered from not having a clear and forceful research voice. Creating a senior leadership position that would allow articulation of the research goals and objectives across NOAA would be a step toward finding the needed voice for research.

Recommendation: NOAA should establish the position of Associate Administrator for Research reporting directly to the NOAA Administrator and who would have budget authority for research across NOAA. This "front office" position in charge of NOAA-wide research should be a career appointment position of a distinguished scientist with broad knowledge of and appreciation for the research throughout NOAA. This recommendation is consistent with both the Operational and the Organizational Principles established in Section II; moreover, it was repeatedly recommended to us during the extensive interview process.

NOAA should also establish a Research Board, as a standing committee of the NOAA Executive Council, chaired by the Associate Administrator for Research. Senior NOAA management should determine the membership. One possible scenario for membership of the Research Board would be the NOAA Assistant Administrators. The current Research Council would be an implementing and information gathering arm of the Research Board (i.e., would serve as a working group). The Research Board would be responsible for execution of the NOAA Research Vision and Plan and for timely progress in meeting research milestones. The Research Board would conduct regular formal reviews of all of NOAA's research and would determine and monitor the overall NOAA research program including ensuring the steady transition of research advances to operational products and needed information services. The Associate Administrator for Research (and Chair of the Research Board) would exercise budget authority over research in NOAA (to include oversight of transition of that research), and thereby the Chair would be charged with achieving the appropriate balance and direction of research and development across the line offices. The Associate Administrator for Research would serve as a primary point of contact for NOAA's external research relationships. Finally, the Associate Administrator will need to help streamline the communication on research matters between NOAA, (DoC) and the Office of Management and Budget (OMB).

In each of the Line Offices there should be a senior manager for the research program reporting directly to the Assistant Administrator. These senior managers should form the Research Council, chaired by the OAR Assistant Administrator.

Transitioning NOAA Research to Operations and Information Services

Finding: The transition of research to operations occurs at many levels and through many channels, and within NOAA there have been numerous successful transfers of research into operations and information services:

- **Modernization of the National Weather Service**: NOAA researchers developed the Next Generation Weather Radar (NEXRAD) in the 1980s and the Advanced Weather Information Processing System (AWIPS) in the 1990s. These technologies are the backbone of today's weather service. The recently deployed Open Radar Product Generator builds on these capabilities and is expected to continue improvements in weather forecasting.
- **ENSO forecasting and seasonal outlooks:** Much of NOAA's El Niño/Southern Oscillation (ENSO) forecasting effort has been transferred, or is in the process of being transferred, from a research mode to NWS operations. The Tropical Atmosphere-Ocean buoy array is among the research assets being moved into an operational line.
- **Tsunami Hazard Mitigation:** Advanced computer models, inundation maps, deepwater buoys, and an expanded seismic network are all products of the NOAA National Tsunami Hazard Mitigation Program, which was transferred from research to operations in 2003.
- **Week Two Climate Outlook:** Experimental, improved 8-to-14-day temperature and precipitation forecast products developed by OAR will be adopted by NWS as a starting point for its operational forecasts.
- **Hurricane Tracking Model:** This model, developed by OAR, is the primary tool for providing NWS guidance to emergency managers in states affected by hurricanes.
- **The Intergovernmental Panel on Climate Change:** In each of the three previous IPCC Assessments, work by OAR scientists has been cited numerous times, reflecting the critical research on climate change performed in the NOAA laboratories. The Chair of Working Group I for the 2007 IPCC Assessment is an OAR scientist.
- **Coastal Change Analysis Program:** This program works to transition emergent capabilities in remote sensing and geographic information systems into land resources information and decision support tools for our nation's coastal managers.
- **Fisheries Oceanography:** NOAA scientists provide important, new information on ecosystem dynamics to assist in developing regional fisheries management policies. In April 2004, NOAA research on issues related to by-catch in the Hawaiian long line fishery contributed to the fishery being reopened after a two-year closure by Federal courts.

While the above examples show successful transfers of research to operational lines and information services (see Appendix VI for additional examples), the transition of research to operations must be significantly strengthened. Greater success could be realized if NOAA had an agency-wide plan to guide the transition of its research investment into its operational mission. We are pleased to see that the recently developed draft 5-year Research Plan addresses this transition challenge. The Review Team notes the development of a Science and Technology

Infusion Plan within the NWS, and we find that this could be a valuable model for a NOAA-wide effort that could contribute significantly to guiding the transition of research to operations and information services.

NOAA must address the proper agency balance between research push and operations pull for research investment. Because the various line offices within NOAA address mission needs from a different approach and timescale, this balance must be addressed and managed by agency leadership. The push-pull tension between research and service is inherent to the enterprise. For example, in fisheries new research on multi-species interactions or on the description of uncertainty has led to changes in the form of scientific advice for management both internationally and nationally. This is an example of research "push"; whereas, much of the recent social and economic science being applied to fisheries has been done because of "pull" from the management side. Likewise, the operational use of advanced weather radar systems is the result of pioneering steps taken by the "push" research community. Improvements in NWS weather information processing systems, on the other hand, came about through management's "pull" for computer systems with better data integration capabilities.

In this regard, the transition process can be enhanced through creative use of test-beds, product validation experiments and prototypes, and planned and funded user evaluations. These are just a few of the activities that should be part of an effort to enhance the transition to operations and services, but all will require explicit and not *ad hoc* funding. We call attention again to guidelines for research and development from Lockheed Martin (see Section II).

Recommendation: The recommended Research Plan should address directly the transition of research to operational products and services. The Research Council and recommended Board should assure that this aspect of the Plan is well executed. The Research Plan should make clear that both research and operations activities share management, programmatic, and fiscal responsibilities for transition.

The lack of an appreciation for the role of "push-pull" in research and the inefficiencies in the transition of research to operations and information products are tied to inadequacies in NOAA's budget structure and program planning and integration. The Associate Administrator in collaboration with the Assistant Administrators must ensure that there is a vigorous and articulated pull from operations and information services products. NOAA's research entities are instrumental in maintaining a healthy research push. The push-pull balance and research to operations and information products should be topics that are addressed on an agency-wide basis through the Research Board and Council. There should be a continuing formal process for evaluating these elements of an agency-wide research investment. In Section II, we noted the DoD 6.1-6.7 system, the NASA Technical Readiness Level, and the guiding principles presented by Dr. O'Neill as existing systems that have proven useful in guiding research to operational products and ensuring clear delineation of roles and responsibilities.

In each of the mission line offices there should be a structure at the senior management level to manage the research enterprise and the transition of research products to operations and information services. In particular, OAR should establish an entity responsible for overseeing the development and evaluation of its research programs, including the degree to which its research is successfully transferred to operations and services. In OAR, this office, reporting directly to the OAR Assistant Administrator, should work closely with the individual responsible for Laboratory and Joint Institutes (a position that would follow a subsequent recommendation). It should also work with OAR's extramural grants programs to ensure a successful pursuit of both a quality research program and one that is appropriately focused on operations and information services.

Research Location within NOAA

Finding: NOAA conducts research in all operational line offices as well as OAR. Some of the research programs have a long history (pre-dating the creation of NOAA in some cases), and aspects of the current distribution are a reflection of this history. There is no formal process or criteria for structuring the NOAA-wide research organization, nor is there a clearly articulated process for determining, on an ongoing basis, where different types of research will be located in the larger organization. Although a corporate sense of "One NOAA" is emerging, the organizational structure of research in NOAA is not fully consistent with the general Organizational Principles described in Section II. However, as noted in our Finding regarding the **Research Plan and NOAA's Mission**, we are encouraged by NOAA's constructive effort to produce an initial -draft Research Plan in a very timely manner.

We find that there is a requirement for long-term research, and it must be identified and managed agency-wide. This investment for the future may not have an immediate application or meet the short-term demands of the agency's programs, but it is crucial for the long-term health of NOAA's mission. This is one of the central roles for OAR and, as such, it is an appropriate entity within the larger NOAA organization to manage the longer-term research investment.

We also find that there is a difference between operational responsibilities and regulatory responsibilities. In general, operations mean regular ongoing activities like weather forecasts using a set of standardized model outputs, and here, the Review Team is concerned that day-to-day operational demands could re-focus the research effort to shorter term ends or eliminate it altogether if the research effort were located primarily within the operational line. Consequently, we believe it is appropriate to separate the purely operational activities from the mid- to longer-term research effort (but retaining appropriate linkages). In mission areas like fisheries, coastal zone management, or more generally ecosystem-based management, NOAA must provide the best advice on which to base management and regulatory decisions. This scientific advice (e.g. fisheries stock assessment) is best based on work in a research environment. Locating this work offers different challenges. NOAA must exercise caution to ensure that the research program is not unduly influenced by regulatory responsibilities, but at same time, it is essential to ensure

that the best science is available and responsive to policy and management needs including the regulatory process.

Building the linkages between research, scientific advice, and management will continue to challenge NOAA. Maintaining the research program within NOS and NMFS with appropriate safeguards for the higher-risk, more basic research efforts can do this. It can also be accomplished by having the research in a separate organizational structure with clear and unambiguous responsibility to meet management and regulatory needs. The Review Team notes that the former approach facilitates the provision of scientific advice for management, but the latter approach may provide a more integrated research effort and enhance extramural involvement. In this regard, we note that the Ocean Commission's preliminary report recommends NOAA's structure be aligned according to its primary functions of assessment, prediction, and operations; management; and research and education.

Recommendation: Consistent with the organizational principles given in Section II and the concepts associated with research and scientific advice as identified in the Findings, NOAA should develop a clear set of criteria for determining where research programs are located within NOAA. These criteria should be applied to new programs immediately, and over the next two years, the Research Board should apply these criteria in a review of the organizational location of the existing research activities and identify opportunities for possible migration.

We recommend retaining and strengthening a line office with the predominant mission of research, i.e., OAR. There must be a stronger commitment generally to long-term, visionary research for all of NOAA areas of responsibility. The NOAA Research Plan must identify the importance of long-term research and its relationship to short- to mid-term research. If not addressed at the agency level, essential long-term, high-risk research (and its potential payoff) will disappear under the pressure of near-term operational requirements. Without long-term research, the science-based operational missions will eventually become untenable. At the same time, it is essential that the "culture" of the research line be such that the research is not isolated from the overall mission and other activities of the organization. Researchers must be responsive to the overall vision and mission of the agency including the operational and regulatory missions. They must be connected to the scientific enterprise as a whole including the scientific advisory functions and the users of science within NOAA as a whole. In this vein, we note that the research being conducted in NMFS and NOS could migrate to OAR, *but only* if the scientific advice associated with ecosystem-based regulatory responsibilities went with the research role. Such a change will involve changing the culture in the research organization to accommodate the need for timely advice for policy and regulation.

The U.S. Commission on Ocean Policy identifies the need for ecosystem-based management and emphasizes that policy must be grounded in an understanding of ecosystems. In establishing this as a "foundation" concept, the Commission added: "Ecosystem-based management will also require a deeper understanding of biological, physical, chemical and socioeconomic processes

and interactions."[2] With this as a clear mandate, NOAA should establish an external Task Team to evaluate the structure and function of ecosystem research in the NMFS, NOS, and OAR laboratories, looking for further rationalization. For example, efforts at the Great Lakes Environmental Research Laboratory dealing with invasive species might be more effectively aligned with related interests in NMFS and NOS elsewhere in the country. Also, the Atlantic Oceanographic and Meteorological Laboratory and the Pacific Marine Environmental Laboratory could work with the (nearly co-located) NMFS and NOS laboratories even more aggressively to forge coordinated NOAA-wide programs in their regions. Already, the NMFS organization into regional fisheries Science Centers is a useful model for interaction and management of laboratories within regions. In each of the fisheries Science Centers there are several laboratories, each with a specific focus area, but they are managed and administered collectively through the Center. This model could, also, be an effective means of integrating the science and research efforts across the line offices. The Task Team should consider opportunities for enhancing functional and thematic alignment of research activities within NOAA utilizing, where appropriate, the geographic alignment of the laboratories within NOAA.

Extramural Research in NOAA

Finding: Extramural research is critical to accomplishing NOAA's mission. NOAA benefits from extramural research in many ways, including:

- World class expertise not found in NOAA laboratories;
- Connectivity with planning and conduct of global science;
- Means to leverage external funding sources;
- Facilitate multi-institution cooperation;
- Access to vast and unique research facilities; and
- Access to graduate and undergraduate students.

Success stories from the extramural research programs are included in Appendix VII. We note that these successes are, unfortunately, not well recognized by Congress or the OMB. During its many visits, interviews and discussions with those interested in the NOAA budget process, the Review Team found a lack of understanding for the necessity of extramural research in support of the NOAA mission. For all the reasons above, NOAA and the budget process must recognize and efficiently use extramural research.

NOAA has, however, not managed this external research component with the proper awareness of its role in the NOAA mission. It has not articulated, agency-wide, the role of extramural research, nor provided Congress and OMB sufficient explanation for the importance of its external partners. A consequence of such a situation seems to be reflected in the President's FY

[2] U.S. Commission on Ocean Policy Preliminary Report, p. 305

2005 budget request for NOAA in which more than half of the proposed reductions in the NOAA climate program are slated for the extramural research community. NOAA cannot accomplish its goals without the extramural community, specifically the universities and institutions that represent the broad range of expertise and resources across the physical, biological, and social sciences. Furthermore, there is the important issue of maintaining a scientific and technologically competent workforce in NOAA and that workforce is another "product" of the external research community.

External research capabilities efficiently broaden NOAA's expertise and capabilities, and yet the granting process is also inconsistent and fragmented. We have received reports that there are too many Announcements of Opportunity for too little money. In addition, the recent change in the structure of appropriations regarding the temporal frame for monies may be disruptive to the current procedures. Timely administration of the grants and contracts is a vital dimension to maintaining robust external research capabilities.

The Review Team notes the proposed relocation of the U.S. Weather Research Program (USWRP) from OAR to the NWS, with the intent of better addressing the transition of weather research into operations. While the transition process is a leading issue for the Review Team, we suggest other organizational approaches to manage such transitions. Moreover, the NOAA USWRP ought also to support extramural research with longer-term objectives aimed at the delivery of future weather services and products. We believe that this vital aspect of the USWRP will be more effectively sustained in the research line office.

Recommendation: The importance of extramural research requires documentation and articulation to the DoC, to OMB, and to Congress. The role of extramural research should be clearly delineated in NOAA's Research Vision and Plan. It should also be an integral part of NOAA's budget presentation to Commerce, OMB and the Hill.

NOAA must use best business practices in its support of extramural research. Extramural research is a critical component of NOAA's business model. Through engagement of the extramural research community, NOAA can effect a more efficient means of identifying its research priorities and addressing the most critical scientific problems. This will entail a continuous involvement by the extramural community in the agency's Planning, Programming, Budgeting and Execution System, as appropriate. For example, the Announcement of Opportunity structure (size, foci, and process) should be reviewed to more effectively employ NOAA's scarce research dollars. NOAA must develop a robust mechanism to engage the extramural research community early during the planning process, through the exploitation of research planning conferences and symposia similar to those conducted by the National Science Foundation and the Office of Naval Research. NOAA must develop a more consistent process for extramural researchers to interact with the agency. A single application process, consistent review procedures, and more consistent timing for extramural grant fund availability, as well as a more rapid grants disposition process would be extremely helpful.

NOAA should formalize the involvement of the extramural community in the assessment and evaluation of the Agency's overall research activity. Also, it is important that during difficult budget periods that NOAA not disproportionably target the extramural research for budget cuts. The Science Advisory Board of NOAA can provide an important leadership role in the assessment of NOAA's extramural research activities.

Cooperative Research in NOAA

Finding: The NOAA cooperative research institutions (including Joint Institutes, Cooperative Institutes, and Joint Centers) have been productive partners with the NOAA research programs for many years. Cooperative research programs, unlike extramural research supported in response to specific announcements of opportunity, involve long-term partnerships between NOAA and other parties. They provide the mechanism for a unique set of partnerships that help leverage the research that NOAA needs to fulfill its mission in serving the Nation's needs.

The Joint Institutes vary in their specific research foci, structure within the university, service responsibilities, and financial scope. All are established through cooperative agreements rather than grants or contracts. Through the cooperative agreements they can conduct research with all line offices within NOAA and are regarded as providing research over the broad scope of the NOAA mission. The larger OAR Joint Institutes have clear interactions with co-located OAR research laboratories and have established vigorous research collaborations between scientists in the laboratories and those in the university. Smaller institutes and institutes not co-located with a laboratory often serve different research communities and research programs within NOAA and emphasize different outreach or service activities.

There is a formal process within the federal government by which Space Grant, Land Grant, and Sea Grant institutions are established (and reviewed). The National Science Foundation has a process for Long Term Ecological Research and Centers of Excellence. There is no clear statement on guidelines for the creation of a NOAA Joint Institute; they can be established on an ad-hoc basis and sometimes they are created by Congressional action.

Recommendation: NOAA should establish a process by which Joint Institutes and other cooperative arrangements with extramural partners are established and maintained. This process should include approach-specific criteria, including:

- Demonstrated track record of working with NOAA scientists on research projects;
- Demonstrated commitment (in terms of resources and facilities) and track record to a long-term collaborative research environment/culture;
- Nationally recognized expertise within the appropriate disciplines needed to conduct the collaborative/interdisciplinary research;
- Unique capabilities in a mission-critical area of research for NOAA;

- Established programs of excellence that support graduate education in the appropriate disciplines, and
- Well-developed business plan including fiscal and human resource management as well as strategic planning and accountability.

The guidelines should also define the review process, the renewal process, and sunset clauses.

Reimbursable Research in NOAA

Finding: In some cases, the historical legacy that we mentioned in an earlier Finding (**Research Location in NOAA**) governs not only the laboratory location but also its funding strategy. The Environmental Technology Laboratory (ETL) in Boulder had historical expertise in remote sensing technologies. The NOAA-specific interest in these technologies has waxed and waned over the years. This led to an aggressive marketing of the laboratory expertise to other government agencies, which in turn led to ETL becoming heavily dependent on non-NOAA funding (i.e., reimbursable funding from other government agencies). This, in itself, is not all bad; however, in the ETL case the laboratory became significantly "in debt" in the late 1990s. Subsequently, ETL was restructured and is now moving into a stronger financial situation. The Air Resources Laboratory, also for historical reasons, is very dependent on reimbursable funding primarily from the Department of Energy (DoE) and the Environmental Protection Agency (EPA). Again, we find that while reimbursable funding has some benefits to NOAA and the government, there are several concerns, and senior management must carefully watch the pattern. The dependence of ETL and ARL on external resources is not unique within NOAA (although the extent of such support is higher here than at most other labs in the agency); levels of reimbursable support vary among all line offices. The issue, however, is that the labs lack any clear corporate guidance regarding solicitation or receipt of such external support.

In sum, we find that reimbursable work to fund laboratory budgets has, at times, conflicted with providing research support for NOAA mission priorities. Some of these arrangements have led to serious budget issues and to problematic mission foci in some laboratories (to other agency work rather than NOAA work).

Recommendation: We strongly recommend that NOAA review its policies and procedures for the management of reimbursable funding and that NOAA develop and implement clear guidelines to better manage this complex issue.

Research Organization within OAR

Finding: The directors of the OAR Laboratories and the Joint Institutes have substantial independence in setting the research agendas for their laboratories and institutes. While there are some positive aspects of this independence, it is obvious to the Review Team that there has not

been sufficiently strong leadership and processes in OAR to ensure that the OAR laboratory activities are well focused and integrated into NOAA's mission. These research activities should have a dynamic and successful transition into the operations or provide important informational services to NOAA customers. We have also found insufficient definition of focus and scope of research activities across the laboratories within OAR.

Recommendation: Within OAR, each laboratory should have a clearly defined mission statement setting forth priorities that are clearly linked to the NOAA Strategic Plan, Research Vision, and Research Plan. This mission statement for each OAR lab could also be used as a prototype for the other NOAA laboratories and serve as a basis for periodically reviewing the relevance of every laboratory's activities to NOAA's mission.

There should be a single authority for OAR laboratory programs and Joint Institutes who would have budgetary authority over the OAR laboratories and Joint Institutes, and who would report directly to the OAR Assistant Administrator (AA). This "Director of OAR Labs and Joint Institutes" would also help establish partnerships, as appropriate, with other agencies and universities working closely with the AA of OAR and the Associate Administrator for Research. Most importantly, this headquarters leadership team will also seek to strengthen and renew partnerships across NOAA.

Research Organization within OAR Boulder Laboratories

Finding: The accomplishments of the Boulder laboratories have contributed significantly to advancing NOAA's mission (See Appendix VIII). Mostly, the laboratories have been foresighted and forceful in pursuing NOAA related science. Successful examples include: the research foundation of the forthcoming production of operational air quality forecasts dates back to studies of natural sources of atmospheric acidity begun decades ago; the modernization of NWS through the introduction of its Advanced Weather Information and Processing System resulted from research and development activities begun years earlier in Boulder; and the important monitoring and understanding of many atmospheric chemical components, including landmark work on the Antarctic ozone hole.

Although there are six OAR laboratories in Boulder, the Review Team did not include the Space Environment Center (SEC) in its recommendations since SEC is proposed to be transferred to the NWS in FY 2005. Frankly, the system was in too much flux for an effective recommendation. Nevertheless, we did find that SEC is a solid scientific center with an operational forecasting capability. We also found that it was not able to adequately support its important research mission nor could it support adequately its operational mission. We are concerned that moving the SEC to the NWS will only address the latter finding, namely a necessary enhancement of its operational capability. This concern is consistent with those expressed earlier in our Finding and Recommendation regarding "**Research Location within NOAA.**"

The unifying themes of the other five Boulder laboratories are: the scientific focus is continental to global with the capabilities to work locally and regionally; the focus is the monitoring and understanding the processes of the chemistry, physics, and dynamics of the atmosphere; and improving predictive capabilities is at the center of the laboratory activities. We believe that the potential benefits from consolidating these five OAR Boulder laboratories are improved quality of research planning and execution; more effective use of infrastructure resources and funding; and increased opportunities for multi-disciplinary collaboration. In sum, consolidation would greatly facilitate the continued development of a *truly internationally recognized center of excellence*. This Center would focus on achieving and synthesizing critically important long-term measurements of the atmosphere to improve understanding and thereby to realize new predictive capabilities. This potential benefit clearly outweighs the near-term, challenging demands and difficulties that such consolidation will impose.

Finally, we find the understandable concerns about security at all government installations may well prove to be detrimental to the essential scientific enterprise. This is particularly true at the NOAA laboratories in Boulder where security measures are restricting the spirit and actuality of openness so critical to the vitality of scientific dialogue. This is important given the strength and breadth of the Boulder scientific community.

Recommendation: The review team recommends that there be a laboratory consolidation of the five OAR laboratories in Boulder into a single Center[3]. The consolidation should seek even better coordination across NOAA and OAR; it should further increase the responsiveness of research to NOAA's operational and information service needs; and it should enhance the visibility of NOAA's collective scientific effort in Boulder. Whatever plan of consolidation is agreed upon, we also strongly recommend that Boulder laboratory leadership continue to make effective technology transfer to the operational parts of NOAA a high priority.

We do not recommend a specific path for this consolidation, but rather there is a set of options that should be explored, refined, and decided upon by OAR and NOAA leadership working closely with the Boulder laboratories management. The consolidation should be structured around clear, easily understood functional capabilities. Guiding these decisions should be a recognition that the scientific and technological activities in Boulder fall into discrete functional categories. One such grouping, for example, is systems development, chemical and dynamical process studies, and atmospheric composition monitoring. Another is systems development, atmospheric composition monitoring, atmospheric dynamics, and atmospheric chemistry. Other possibilities exist, however, that link the chemical monitoring and process studies functions, while maintaining a distinct dynamical studies activity. Our point is that synergies currently exist among the five OAR Boulder laboratories that can be strengthened by a considered realignment and consolidation of the management structure focused on mission-critical research functions. Acute care must be given not to weaken existing strengths based upon natural synergies, appropriate sizes, and shared commitments.

[3] The Review Team does not propose any name for this center.

Whatever is developed must address the means to attain the benefits of improved quality of research planning and execution, more effective use of infrastructure resources, increased opportunities for multi-disciplinary collaboration, and what and how to realize a shared vision.

Key to the success of a renowned Boulder Center will be the appointment of a scientific leader for the entire OAR Boulder enterprise. Retaining the best scientists in OAR, and maintaining the highest quality research by them, will only occur if they continue to be led by distinguished scientists who have demonstrated leadership and management skills. This recognition is central to an effective implementation of this recommendation.

Senior management, in Boulder, in OAR, and in NOAA should consider options for consolidation and work towards implementing the most viable one with deliberate speed. It will be important to involve the relevant Joint Institutes (CIRES and CIRA) in such considerations, because of the impact on these important components of the potential Boulder Center.

Research Organization within the Air Resources Laboratory

Finding: The Air Resources Laboratory (ARL) is the most managerially complex laboratory within OAR (see Appendix IX). It serves the nation well, but the complexity of the organization may limit its long-term effectiveness and ability to identify with NOAA's mission. It is important to note that NOAA is an interconnected part of the federal research program, and care should be exercised that this important government capability not be lost. This is important since ARL contains expertise that is important to national research responsibility, interests, and capability.

Recommendation: ARL should be better aligned with the NOAA mission and the emerging needs of Homeland Security. There must be greater NOAA oversight of its direction and its relationships. All significant inter-agency activities should be subject to an MOU similar to that with the Environmental Protection Agency regarding the ARL air quality and air-surface modeling activities in Research Triangle Park, N.C. As we discussed in "**Research Location in NOAA**," we recommend that that NOAA and OAR review their policies and procedures for the management of reimbursable funding with an objective of developing a set of clear guidelines.

There should be a core capability analysis conducted to determine areas of most effective mission alignment and to identify opportunities for improved organizational coordination. This is particularly important given the increasing importance of air quality forecasting and the reality of Homeland Security placing greater importance on predicting atmospheric dispersion.

If the analysis demonstrates that there could be gains in efficiency, enhancements in synergy, elimination of duplication of efforts, and increased organizational and financial transparency, then the functions of ARL should be realigned, consolidated with other entities, or eliminated.

We believe that the service to the nation and the coherence of the budget would be improved by this analysis. In particular, the valuable services of ARL would actually, in the end, be enhanced. We acknowledge that any transition would be difficult and challenging, so that it would need to be paced by clear parameters and needs. Finally if the core capability analysis of ARL proves useful, then NOAA should consider applying a similar analysis to those other research components of the organization that are supported substantially by reimbursable funding.

As indicated at the outset of this Section, the Review Team recognizes that these Findings and Recommendations, while far-reaching, do not cover the full spectrum of NOAA research issues. Nevertheless, the issues and suggested actions addressed here recognize fundamental opportunities for dramatic improvement to the NOAA research enterprise.

IV. Responding to the Charge

We now turn to answering the Charge of NOAA's Science Advisory Board (SAB). As stated in the Introduction, in response to FY 2004 Congressional directives, NOAA asked its Science Advisory Board to establish a Research Review Team to address five primary issues. We have sought to establish the context for change by setting forth Operational and Organizational Principles (Section II) and a set of Findings and Recommendations (Section III). Within this context, we now respond explicitly to the Charge from the SAB. We note, however, that our responses to the Charge must be viewed in the environment set in Sections II and III.

- *Does the research conducted by the Office of Oceanic and Atmospheric Research provide effective support and vision for NOAA by enabling it to improve products and services, and to introduce new products and services through the transfer of technology and the development and application of scientific understanding?*

  The research conducted and supported by OAR provides the scientific basis for the agency's future products and services. Despite numerous examples of successfully transferring this research into operations, there is a need to give substantially more emphasis and structure to this process. OAR research is clearly more closely linked to NWS operational activities than to the other lines such as NOS and NMFS. Better linkage and development are needed for OAR's research to be fully leveraged for the NOAA mission.

  The transfer of research into operations must be addressed on an agency-wide basis through the Research Council and Board, and there must be a continuing formal process for evaluating the effectiveness of the transition process. There are two important components of this process. The first is the need for highest-level oversight and budgetary control of NOAA's corporate research portfolio. Additionally, each of the line offices should institute a formal structure at the senior management level to address this process. OAR, in particular, should establish an entity reporting directly to the OAR Assistant Administrator that oversees the development and evaluation of its intramural and extramural research programs, including the degree to which this research is successfully transferred to operations and services. This position must coordinate with the position of over-seeing the lab structure in OAR to ensure efficient use of all research resources available to OAR.

  The introduction of NOAA matrix management and a new Research Plan will require close management of research to ensure the academic and private research communities are integral partners in this investment.

- *Is OAR adequately linked to NOAA's other line offices (National Weather Service, National Environmental Satellite Data and Information Service, National Marine Fisheries Service, National Ocean Service) and are the research programs relevant to the needs of these organizations? If so, what are the benefits? If not, what changes would the Team recommend? Is it adequately connected to the Program Planning and Integration Office?*

There are good examples of linkages between the NOAA line offices that result in collaborative research programs across lines, a clear connection of research to operational needs, and the transition of research products to operational products. Appendix VI contains a set of example success stories that document that the OAR research programs have demonstrated relevance and benefits to the needs of the other line offices. However, these linkages are most often developed on an *ad hoc* basis resulting from connections between individual researchers or programs rather than organizational imperatives.

The benefits of linkages between OAR and other NOAA lines are large and crucial to NOAA's mission as a science-based agency. The interactions must be formalized organizationally, encouraged for both the research and operations, and recognized fully by NOAA corporately. The developing NOAA Research Plan recognizes the connections of the research efforts across the agency, and NOAA's new mission goal matrix structure (overseen by the PPI office) and PPBES tool are designed so that programs develop an "end-to-end" perspective, from OAR research to the delivery of products and services. The matrix structure establishes an important means of engaging both the research (OAR and other) programs with the operational programs in the development of plans, budgets, and performance metrics.

The Review Team recommendation for better using the functional and/or regional location and co-location of NOAA laboratories, possibly using a regional center model, will also help improve the connections between line office efforts. In this vein, we recommend that NOAA should establish an external Task Team to evaluate the structure and function of ecosystem research in the NMFS, NOS, and OAR laboratories, with an eye for further rationalization.

- *How do the management structure and processes of OAR compare to those of other agencies managing research? Based on that analysis, should OAR be dissolved into its constituent components and distributed across NOAA, should it be left as is, or should NOAA consolidate all of its research activities into a single organization?*

Neither NOAA nor OAR has the management structure or process to manage a large research enterprise that we observed in other science-based organization. We reviewed two large federal agencies with significant research budgets (DoD and NIH; we also had discussions with people knowledgeable about DoE and NASA), two very large commercial enterprises (Lockheed Martin and General Motors), and the general model used at research universities. The lack of a research plan in NOAA and thus the lack of corresponding direction for conduct of research in OAR encourage the labs to determine their own destiny. There is no formal process to ensure the research investment in OAR meets the needs of the NOAA mission. As we found in all successful research enterprises, there is one person responsible for that mission, and there is formal guidance [research plan] that guides all that expend resources for that mission. There are also mechanisms in place to formally review the research investment and ensure it supports of the operational mission of the parent organization. Also, for all science based operational agencies or companies we reviewed,

there were organizational and operational mechanisms that provided funding stability for a research program with a longer-term focus. With the development of a NOAA research plan and data obtained during this research review, NOAA OAR can quickly implement changes necessary to manage a successful research program for NOAA.

Regarding the issue of migrating all of NOAA research to the line offices, this is not a wise course of action. The changes that we recommend in management and structure are more appropriate to the issues facing OAR and NOAA. Our conclusion not to recommend the dissolution of OAR into its constituent components and distributed across NOAA was based upon extensive interviews and discussions. The discussion with Robert Frosch was particularly beneficial since he had written an important, relevant paper (Appendix X) that addressed the issue of where research should be located within an organization, and therefore it is directly relevant to the question: "...should OAR be dissolved into its constituent components and distributed across NOAA, should it be left as is, or should NOAA consolidate all of its research activities into a single organization?" With regards to dissolving OAR into its constituent components and distributing them across NOAA, his conclusions are set forth in a particularly apt metaphor:

> "Having been in the R&D business for some time, I keep my eye on the spring styles in R&D and try to decide whether I think they are hot stuff or not. The current fad seems to be: 'Let's breakup all that central R&D, which does something or other but we don't know what, and put it out in the divisions. If we can't pull it all out, then let the divisions buy what they need instead of letting those people in the ivory tower do all that stuff we don't understand. We must have relevance now, with everything results-oriented, and small improvements the big thing.'
>
> I listen to all this (I've heard it before) and it reminds me of someone investing in a farm who insists upon saying, 'Don't ask me to buy any seed, please don't bother me with investing in planting, I don't want to be around when you're cultivating, and I don't care about irrigation. But when you get to the harvest, call me, and I'll be there to help you out.'
>
> We know what happens to that farmer. That farmer—or that investor—ends up with no crop and no harvest. I have a feeling that in a few years we shall discover that the farm that was going to be planted, seeded, irrigated, and produce a good harvest, will for some reason be producing no fruit or stunted fruit."

The major challenge for NOAA is connecting the pieces of its research program and ensuring research is linked to the broader science needs of the agency. As we have indicated in the recommendations, this is best done by strengthening organizational processes, clarifying shared responsibilities regarding transition of research, and establishing a higher level of corporate oversight, all consistent with fundamental principles for structuring and operating a research organization. The wholesale dissolution of OAR and distribution of its resources

and talent to the other lines would splinter rather than more tightly connect the science and research enterprise. There is undoubtedly a need to improve the linkage of research to operations and change the culture of OAR to value and support this linkage. However, breaking OAR apart and distributing the parts to the other line offices would be a mistake.

Regarding the question, "Should NOAA consolidate all of its research activities into a single organization?" we do not have a sufficiently clear sense of direction to make a definitive recommendation. We do, however, have a clear sense of the scope of realistic and reasonable possibilities, which range from the current distribution of research across the lines to migrating increasing proportions of research from the operational lines to OAR. This migration must include a defined, clear, and unambiguous responsibility to meet management and regulatory needs. In this regards, we believe that a focused thematic study would likely prove to be useful, and as such, we recommend (as noted above and in Section III) establishment of an external Task Team to evaluate the structure and function of ecosystem research in the NMFS, NOS and OAR laboratories, with an eye for further rationalization.

- *Focusing specifically on the OAR labs, would consolidation of the labs yield a more effective scientific program? If so, what would the Team recommend?*

The OAR Laboratories are, as are all NOAA laboratories, centers, and Joint Institutes, an important and integral part of NOAA's scientific program. In the opinion of the Review Team, there is an opportunity to increase the effectiveness of the five OAR laboratories in Boulder through consolidation. Specific findings and recommendations for a Boulder consolidation are contained in **"Research Organization within OAR Boulder Laboratories."**

We believe that forming a Boulder Center would open the possibility of not only more effective management but also strengthening the ability of scientists within each lab to interact with colleagues in other labs (at Boulder or elsewhere). This is important and needs to be fostered to the maximum extent possible. With increased connectivity to a broader set of NOAA laboratories, there would, undoubtedly, follow an enhanced effectiveness in meeting a broader set of NOAA needs (e.g., applying breakthroughs in weather and air quality forecasting to a more diverse set of NOAA modeling efforts). Moreover, having the ability and the responsibility to act as a unit will allow the Boulder leadership to confront even more effectively the significant Earth system challenges. And, acting as a unified team, the Boulder Center would be positioned to become an even stronger world-class institution for atmospheric research.

- *Would lab consolidation yield a more efficient structure, by reducing administrative overhead and infrastructure/manpower? If so, what would the Team recommend? Strong fiscal constraints for the foreseeable future mean that the Congress, the Office of*

Management and Budget, and NOAA leadership must seek ways to prioritize more effectively research activities.

The areas offering the greatest potential for efficiencies involve functions at a consolidated Boulder Center. One aspect of such efficiencies is described above (in terms of increased attention to a broader set of NOAA-wide issues, for which a consolidated Boulder complex may provide new opportunities). Specifically, there may be efficiencies from the consolidation from five Financial Management Centers to one; centralizing certain functions such as management/clearance of Memoranda of Agreement (MOA) and Memoranda of Understanding (MOU), personnel and training, safety and security, and some procurement actions. Having one staff expert in some of these subject matter areas could be more efficient than the current situation where each laboratory maintains its own expertise. Some efforts such as time and attendance and travel are proportional to the size of the staff being served and would likely remain the same. We note that progress has already been made through the executive management system in information technology. Some additional efficiency may be expected by consolidation into one IT security plan and standardized hardware and software; this issue will need further study to consider the impact on scientific operations. It is unlikely that there will be substantial financial savings from a consolidation but, if any, it should be re-invested in the NOAA research enterprise.

It is important to note, however, that the recommendations of the panel include increased responsibilities (generally associated with program planning and integration) concomitant with a Boulder laboratory consolidation. Consequently, while there could be efficiencies gleaned by reducing some potentially redundant administrative responsibilities, there should be a need for increased investment in professional support for strategic planning and program assessment. Before any final determinations of efficiencies can be made there must be a more detailed study of functions to be performed and a preliminary identification of people to do these functions at various levels in the organization (including OAR HQ). The Review Team also notes that such a study must be done in close coordination with NOAA's ongoing assessment of efficiencies in its system of administrative support, since some of the administrative functions addressed above may be handled differently NOAA-wide in the future.

In closing Section III on Findings and Recommendations we noted that we are seeking to give suggestions on direction that NOAA should take to improve an already well-respected research program. It is in that same spirit that we respond to the specificity of the charge. We believe that there is a path of constructive change that will lead to a stronger and better organized and better supported research enterprise that is even more responsive to NOAA's mission. If changes are not adopted, then NOAA will remain a collection of weakly linked research enterprises without a strong centralized focus supporting NOAA's mission.

However, we believe that this Report provides NOAA the opportunity to change and serve the nation better.

V. Closing Comments

In closing, there are three themes that we want to revisit so that they might be seen afresh in the context of the overall Report. We also submit a final recommendation.

The Value of Research. The Review Team recognizes and appreciates that the language in the Senate report speaks only about the need for research to assist "line offices in developing timely solutions to problems confronting NOAA now and in the next 5 years." Meeting the near-term, unmet operational needs of NOAA must be a high priority. However, producing significant advances in weather and environmental forecasting, providing well-reasoned prognostic climate information, and anticipating and meeting the information service needs for commerce and transportation and ecosystem management require that NOAA address an array of increasingly complex scientific issues as well as deal with ever more complex organizational elements. This reality is unavoidable, and it must be wisely balanced against pressing very near-term operational needs. We note also that there is a danger that in focusing research exclusively on operational needs of various services, climate-relevant research needs might go unmet. We acknowledge that the matrix Goal alignment should help limit this risk, but the relationship between NOAA's Goal teams and its line offices is still in a formative stage, so that we cannot be assured on this point.

We strongly believe that a guiding mid-to-long-term view is essential for cost effective research management - it is essential to the future of NOAA. It is the longer-term view of OAR that creates the foundation needed to supply the products of the future. For example, NOAA's climate research (on both climate variability and change) started about 30 years ago. Greatly enhanced operational benefits of climate change research still lie 10-20 years in the future, and for seasonal forecasting, 5-10 years will still be needed to reach the maturity comparable to that for numerical weather prediction. The Review Team firmly supports the tenet that long-term purposeful research is a required dimension in NOAA's overall research program. The Review Team is likewise aware of the need for near-term operational products and information services. Unfortunately, as discussed in Section III, the Review Team found that NOAA does not have an agency–wide research plan or research management structure, let alone a blueprint or formal process to guide the transition of its research investment into its operational mission. Filling this void is essential and creating a "front office" research management structure and authoritative process are fundamental for success. As we stated in Section III, we are pleased that following our Recommendation in our initial Report of January 29, 2004 that NOAA has produced an initial Draft 5-year Research Plan, and we also applaud NOAA for charging its Research Council to prepare a 20-year Vision for Research.

The Organizational Location of Research in NOAA. We believe that there are programmatic migration steps that need to take place both within OAR and NOAA; we have tried to provide explicit guidance in this area. The issues are, however, complex. There are important products and services that do not have a clear operational line office home (e.g., climate-relevant observations) or a singular line home (e.g., ecosystems research supporting both fisheries

operations and coastal zone management activities). Consequently, if these elements are migrated to a line office, then there is a danger that these critically important activities might be compromised. In addition, the near-term pressure inherent in the operational line offices raises serious questions about their viability as appropriate homes for developing the operational products of the future. In a similar vein, a vital and important part of research at NOAA is the development and delivery of products and information services. Hence, there are observations and research products that are produced routinely (e.g., measurements of greenhouse gas concentrations for climate studies) but are not routine—namely the quality of the observations and the sensitivity required to monitor and constantly upgrade them requires a research environment. Also, if NOAA is to continue to attract "the best and the brightest" scientists, a viable, vibrant, and visible research enterprise must be sustained. Finally, we are aware that physical proximity between research and operations is often an important catalyst for successful transitions.

It seems to us that the broader aspects of the issue of "what is where, and why" might be addressed subsequently in the context of expected developments nationally and internationally. The recommendations in the preliminary report U.S. Commission on Ocean Policy are specific regarding the important role that NOAA has in serving this nation and recommends strengthening the organization to ensure meeting the recommendations of the report to Congress and the President. The emerging initiatives of the Earth Observations Summit process may well raise important issues that will challenge current organizational structures for both research and observations.

Perhaps an even broader study is needed that looks across government at the issue of "what is where, and why" regarding the monitoring and understanding of our planet. The National Research Council/National Academy of Science might undertake such a study focused on new partnerships, including multi-agency partnerships, and new missions leading to even greater effectiveness and scientific return.

The Way Forward. The Research Review Team dedicated many hours interviewing NOAA personnel and reviewing documents that apply to research in NOAA. We also spent several hours with members of the external scientific community and with Congressional staff and examiners at the Office of Management and Budget on current issues relative to NOAA's research enterprise and related agency issues. Almost without exception, from field lab personnel to researchers, lab directors and front office personnel, NOAA employees acknowledge that procedures and structure must change for NOAA to perform its public mission with the support of Congress, the Administration, external partners, and the entire NOAA team. And just as NOAA was formed by a recommendation of the Stratton Commission 35 years ago to help the nation better manage our relationship with Earth; the recently released preliminary report of the U.S. Commission on Ocean Policy again places NOAA in the spotlight. The Administration has designated NOAA as the lead U.S. agency for the Global Earth Observing System of Systems and NOAA has a lead role in the nation's Climate Change Science Program. To respond to the challenges attendant with these roles, the nation needs and deserves a robust,

forward-looking federal agency focused on understanding and predicting changes in the environment of our planet.

There have been previous external reviews conducted that recommended changes in how NOAA defined and conducted research; we found little change as a result of these reviews and recommendations. The fact that Congress directed very specific actions with regard to NOAA research in the FY 2004 appropriations bills also indicates that NOAA has not instituted the necessary changes that Congress deems necessary. We also heard similar concerns from OMB.

A Final Recommendation. To ensure that NOAA takes appropriate action, the Review Team believes that an External Committee should be established to review this report and previous relevant reviews and to report directly to the NOAA Administrator on progress in reforming the research enterprise in NOAA.

In this Report, we have focused upon evolutionary changes that will lead to a stronger and more effective NOAA. This will be good for the country and the planet. We have also considered and debated more radical changes such as dissolving the lines and restructuring NOAA along simpler dimensions such as: Observations, Services, Regulation, and Research. This more revolutionary change merits further consideration.

NOAA has a distinguished record of accomplishment in performing and supporting oceanic and atmospheric research and in providing needed products and services. To meet the new demands and challenges, including those posed by the Climate Change Science Program, the Global Earth Observing System of Systems, and the U.S. Commission on Ocean Policy report, NOAA must embrace changes in its operational procedures as well as organizational structure and culture. We see evidence that changes for the better are beginning to take hold in NOAA, and we urge the agency to continue down this path, using this Report as a helpful guide.

Appendix I

Request to Establish NOAA Research Review Team and Terms of Reference for Team

Dr. Len Pietrafesa
Interim Chair, NOAA Science Advisory Board
Director of External Affairs
College of Physical & Mathematical Sciences
North Carolina State University
Box 8201, 118 Cox
Raleigh, NC 27695-8201

Dear Dr. Pietrafesa:

I request the NOAA Science Advisory Board (SAB) conduct a review of NOAA Research for the purpose of improving the effectiveness and efficiency of its research enterprise. The review will provide findings and recommendations that will be used by NOAA to enhance its research organization and connectivity to operational activities. Specific instructions to the review panel, hereafter referred to as the NOAA Research Review Team, or Review Team, are contained in the enclosed Terms of Reference, A Strategy to Respond to Congressional Language Pertaining to the NOAA Office of Oceanic and Atmospheric Research.

I propose an Ad Hoc Working Group of the SAB, consisting of five members, and which will be disbanded after the review. I request your concurrence on the suggested panel members. These are distinguished individuals who represent a diverse range of expertise and perspectives on the organization, structure and management of research. Three of the members are past or future members of the SAB. I further propose that the panel be chaired by Dr. Moore.

We have contacted Dr. Berrien Moore III, Dr. Richard D. Rosen, Dr. Richard W. Spinrad, Dr. Warren Washington, and RADM Richard West and they are willing and able to serve on the Review Team. I would like your thoughts on all these potential panelists.

Berrien Moore III
Dr. Moore is a Professor of Systems Research and has been the Director of the Institute for the Study of Earth, Oceans, and Space at the University of New Hampshire since 1987. Actively involved on panels and committees at the National Academy of Science, he ended his Chairmanship of the National Academy's Committee on Global Change Research in 1999.with the publication of Global Environmental Change: Research Pathways for the Next Decade From January 1998 through January 2003, Professor Moore served as Chair of the overarching

Scientific Committee of the International Geosphere-Biosphere Programme (IGBP) and also served as a lead author within the Intergovernmental Panel on Climate Change's (IPCC) Third Assessment Report. In July 2001 he chaired the Global Change Open Science Conference in Amsterdam and is one of the four architects of the Amsterdam Declaration on Global Change. Professor Moore is the author of numerous scholarly publications on the carbon cycle and related topics and over the years has been called upon by the United States Congress to give testimony on the results of research regarding the carbon cycle and global climate change.

Warren Washington
Dr. Washington is an internationally recognized expert in atmospheric science and climate research specializing in computer modeling of the Earth's climate and has published more than 100 papers in professional journals. He is a senior scientist and head of the Climate Change Research Section in the Climate and Global Dynamics Division at the National Center for Atmospheric Research (NCAR) and is the current Chair of the National Science Board. In 1999 he was elected by the Woods Hole Oceanographic Institution Board of Trustees as a member of the corporation for a three-year term; he was appointed by the U. S. Secretary of Energy to the DOE Biological and Environmental Research Advisory Committee (BERAC) and the Advanced Scientific Computing Advisory Committee; and in February of 2002 he was elected to the National Academy of Engineering. Also in 2002, he was appointed to the Science Advisory Panel of the U.S. Commission on Ocean Policy and the National Academies of Science Coordinating Committee on Global Change

Richard Rosen
Dr. Richard Rosen is the incoming Assistant Administrator for Oceanic and Atmospheric Research at the National Oceanic and Atmospheric Administration. He previously served as Vice President and Chief Scientist of the Research and Development Division of Atmospheric and Environmental Research, Inc. Dr. Rosen is a Senior Lecturer at M.I.T. and past President of the American Meteorological Society. He has published over 60 scientific papers on many different aspects of large-scale atmospheric behavior.

Richard Spinrad
Dr. Spinrad is the Assistant Administrator of the National Ocean Service. Before joining NOAA, he served as Technical Director in the Office of the Oceanographer of the Navy where he served as the senior civilian technical advisor to the Navy's meteorological and oceanographic command (METOC). Dr. Spinrad had previously served as Executive Director for Research and Education at the Consortium for Oceanographic Research and Education (CORE). He has worked as a research scientist and is the past President of Sea Tech, Inc., a major manufacturer of oceanographic sensors. Dr. Spinrad received a Ph.D. in marine geology from Oregon State University. He has published more than 50 technical articles and is the editor of one textbook and several special issues of marine-oriented journals. He served as Editor-in-Chief of Oceanography magazine and has been an elected member of the Council of The Oceanography Society. Dr. Spinrad also served on the faculty of the U.S. Naval Academy and George Mason University.

Richard West
Rear Admiral West is President of the Consortium for Oceanographic Research and Education (CORE). Before joining CORE, RADM West served as Oceanographer and Navigator of the Navy. He held a variety of ship and shore commands during his naval service including Commanding Officer of the Surface Warfare Officers School. RADM West graduated from the University of Rochester, receiving his commission through the ROTC program. He holds Master's degrees in management and national security.

NOAA Research headquarters staff will work with you and the SAB as needed to plan and conduct the review. Administrative and technical support for the review will be provided by Mary Anne Whitcomb at (301) 713-2454, extension 173. Please contact Michael Uhart at (301) 713-9121, extension 159, for any issues regarding the SAB.

Sincerely,

VADM Lautenbacher

Enclosure

cc: (w/enclosure) J. Kelly
S. Rayder
L. Koch
M. Uhart

Addendum: Biographical Information:

Andrew Rosenberg
Dr. Andrew Rosenberg is a Professor in the Institute for the Study of Earth, Oceans, and Space at the University of New Hampshire where, prior to April 2004, he was dean of the College of Life Sciences and Agriculture. Prior to assuming the dean's position in June 2000, he was the deputy director of the National Marine Fisheries Service (NMFS) in the National Oceanic and Atmospheric Administration. He was also the northeast regional administrator for NMFS for four years. He has served as the U.S. representative to international organizations including the Food and Agriculture Organization of the United Nations and the Northwest Atlantic Fisheries Organization. With his expertise in marine biology and living marine resource conservation, he has earned recognition from such diverse organizations as the U.S. Coast Guard and the World Wildlife Fund.

STRATEGY TO RESPOND TO CONGRESSIONAL LANGUAGE PERTAINING TO THE NOAA OFFICE OF OCEANIC AND ATMOSPHERIC RESEARCH

1. Purpose: The 2003 House and Senate Appropriations Subcommittee Reports have language pertaining to the Office of Oceanic and Atmospheric Research (NOAA Research). The 2003 House Appropriations Commerce Justice State (CJS) Subcommittee Report has requested that NOAA develop a laboratory consolidation plan. The report accompanying the House CJS Appropriations Subcommittee mark states: "In recognition of current resource limitations the Committee is forced to operate within, the Committee directs NOAA to review the continued requirements for twelve separate laboratories, six of which are located in Boulder, Colorado. The Committee directs NOAA to submit a laboratory consolidation plan to the Committee by March 15, 2004." The Senate report language states: "NOAA is directed to report to the Committee on Appropriations on the costs and benefits of breaking OAR up into its constituent parts and distributing those parts as desirable to the other line offices. The report should specifically address how the newly configured research sector will directly assist line offices in developing timely solutions to problems confronting NOAA now and in the next 5 years."

2. Review Team: NOAA will appoint a Blue Ribbon Review Team, under the auspices of the Science Advisory Board (SAB), to conduct the review. The confirmed team members are: Dr. Berrien Moore III (UNH), Chair, Dr. Richard D. Rosen (AER, Inc), Dr. Richard W. Spinrad (NOS AA - NOAA), Dr. Warren Washington (NCAR), RADM Richard West (CORE).

   Addendum: Additional Team Member added
   At the January 6, 2004 meeting of the NOAA Science Advisory Board, a motion was passed which stated "SAB requests the addition to the RRT of the NOAA's Assistant Administrator for Fisheries (or his designee)."The NOAA Assistant Administrator for Fisheries provided a prioritized list of RRT nominees to the Chair of the SAB, from which the Chair selected Dr. Andrew A. Rosenberg, Dean of the College of Life Sciences and Agriculture at the University of New Hampshire, for an ex-officio membership.

3. Review Team Support: Background information will be compiled including line office administrative costs, data for each lab on staffing, costs, facilities, and programs. Program data will include information such as: description of programs, requirements for programs and users of program results, performance measures and relationship to similar programs in other laboratories or in NOAA. Relevant material from earlier studies of laboratories, results from the program baseline assessments that will be completed this fall, laboratory reviews, and other existing data will also be assembled. NOAA will also provide information on the costs of integrating the constituent parts of NOAA Research to the appropriate line offices. Mary Anne Whitcomb is the lead NOAA contact person providing support for the Review Team.

4. Charge to the Review Team: Using the information provided above, and any additional information garnered by the Review Team, please address the following questions:

   4.1 NOAA is a science-based agency with operational responsibilities. Does theresearch conducted in the Office of Oceanic and Atmospheric Research (NOAA Research) provide effective support and vision for NOAA by enabling (i) the improvement of products and services, and (ii) the introduction of new products and services through the transfer of technology and the development and application of scientific understanding?

   4.2 Is NOAA Research adequately linked to NOAA's service organizations (i.e., NWS, NESDIS, NMFS, NOS, etc.) and are the research programs relevant to the needs of these organizations? If so, what are the benefits? If not, what changes would you recommend?

   4.3 How does the management structure and processes of NOAA Research compare to those of other agencies managing research? Based on that analysis, should NOAA Research be dissolved into its constituent components and distributed across NOAA, should it be left as is, or should NOAA consolidate all of its research activities in a single organization?

   4.4 Focusing specifically on the NOAA Research labs, would consolidation of the labs yield a more effective scientific program? If so, what would you recommend?

   4.5 Would consolidation of labs yield a more efficient structure, by reducing administrative overhead and infrastructure/manpower? If so, what would you recommend?

5. Timing: The consolidation plan is due to the Appropriations Committee on March 15, 2004. The report is due to the Commerce Department February 2, 2004. The Review Team should provide its draft report, including findings and recommendations, to the SAB by mid-December. A copy of the draft report will also be provided to NOAA for technical review. The SAB will meet early January to consider the draft report and deliver its Final Report to NOAA by mid-January to allow NOAA leadership time to develop its final consolidation plan by February 2.

   Costs: NOAA Research will pay for all the costs associated with the development of this plan.

Appendix II

Selected Recommendations from the Preliminary Report (Governors Draft) of The U.S. Commission on Ocean Policy

Recommendation 7–1. Congress should pass an organic act that codifies the establishment and missions of the National Oceanic and Atmospheric Administration (NOAA). The act should ensure that NOAA's structure is consistent with the principles of ecosystem-based management and with its three primary functions: assessment, prediction, and operations; resource management; and research and education.

Recommendation 17–4. The National Invasive Species Council and the Aquatic Nuisance Species Task Force, working with other appropriate entities, should establish a national plan for early detection of invasive species and a system for prompt notification and rapid response. Congress should provide adequate funding to support the development and implementation of this national plan.

Recommendation 25–1. Congress should double the federal ocean and coastal research budget over the next five years, from the 2004 level of approximately $650 million to $1.3 billion per year. A portion of these new funds should be used to support research directed by the regional information collection programs, enlarge the National Sea Grant College Program, and support other high priority research areas described throughout this report.

Recommendation 25–4. Congress should support a greatly expanded national ocean exploration program. The National Oceanic and Atmospheric Administration and the National Science Foundation should be designated as the lead agencies, with additional involvement from the U.S. Geological Survey and the U.S. Navy's Office of Naval Research. Public outreach and education should be integral components of the program.

Recommendation 26–9. Congress should fund the Integrated Ocean Observing System (IOOS) as a line item in the National Oceanic and Atmospheric Administration (NOAA) budget, to be spent subject to National Ocean Council direction and approval. IOOS funds should be appropriated without fiscal year limitation. NOAA should develop a streamlined process for distributing IOOS funds to other federal and nonfederal partners.

Appendix III
Meetings Held By NOAA Research Review Team
September 26, 2003 – May 25, 2004

September 26, 2003 -Washington D.C.

- Conrad C. Lautenbacher Jr. - Vice Admiral, U.S. Navy (Ret.), Under Secretary of Commerce for Oceans and Atmosphere and NOAA Administrator

October 7, 2003 - Silver Spring, Maryland

Informal meeting and discussions with OAR's Laboratory and Headquarters Staffs.

October 22-23, 2003 - Silver Spring, Maryland

Individual meetings with:

- Louisa Koch - Deputy Assistant Administrator, Oceanic and Atmospheric Research
- Daniel L. Albritton - Director, Aeronomy Laboratory
- Bruce B. Hicks - Director, Air Resources Laboratory
- Peter B. Ortner - Acting Director, Atlantic Oceanographic & Meteorological Laboratory
- Randall Dole - Director, Climate Diagnostic Center
- David J. Hofmann - Director, Climate Monitoring & Diagnostics Laboratory
- William D. Neff - Director, Environmental Technology Laboratory
- Alexander E. MacDonald - Director, Forecast Systems Laboratory
- Ants Leetmaa - Director, Geophysical Fluid Dynamics Laboratory
- Stephen B. Brandt - Director, Great Lakes Environmental Research Laboratory
- James F. Kimpel - Director, National Severe Storms Laboratory
- Eddie N. Bernard - Director, Pacific Marine Environmental Laboratory
- Kenneth A. Mooney- Deputy Director, Office of Global Programs
- Ronald C. Baird - Director, National Sea Grant College Program
- Greg W. Withee - Assistant Administrator, National Environmental Satellite Data & Information Service
- John E. Jones - Acting Assistant Administrator, National Weather Service
- Michael P. Sissenwine - Director, Northeast Fisheries Science Center, National Marine Fisheries Service
- Donald Scavia - Senior Scientist, National Ocean Service
- Mary Glackin - Assistant Administrator, Program Planning and Integration

November 4, 2003 - Rosslyn, Virginia

Science Advisory Board Meeting - Open Forum

Science Advisory Board Members

- Leonard J. Pietrafesa - Interim Chair, Director of External Affairs, College of Physical and Mathematical Sciences, North Carolina State University
- Vera Alexander - Dean School of Fisheries and Ocean Sciences, University of Alaska
- David Blaskovich - Sales and Marketing Executive, Weather and Environmental Markets, IBM Corporation
- Otis Brown - Dean, Rosenstiel School of Marine and Atmospheric Science University of Miami
- Peter M. Douglas - Executive Director, California Coastal Commission
- Susan Hanna - Professor, Oregon State University
- Arthur E. Maxwell - Professor Emeritus, University of Texas
- Jake Rice - Canadian Stock Assessment Secretariat, Fisheries and Oceans Canada
- John T. Snow - Dean, College of Geosciences, University of Oklahoma
- Denise Stephenson-Hawk - Chairman, The Stephenson Group

NOAA Senior Staff in Attendance

- Conrad Lautenbacher Jr. - Vice Admiral, U.S. Navy (Ret.), Under Secretary of Commerce for Oceans and Atmosphere and NOAA Administrator
- James R. Mahoney - Assistant Secretary of Commerce for Oceans and Atmosphere and Deputy Administrator, NOAA
- John J. Kelly Jr. - Deputy Under Secretary, NOAA

November 25, 2003 - Washington, D.C.

- Ronald D. McPherson - Executive Director, American Meteorological Society (AMS)
- John Orcutt - President-Elect, American Geophysical Union (AGU)
- Peter Folger - Outreach/Government Affairs, American Geophysical Union (AGU)

November 25, 2003 - Washington, D.C.

- James R. Mahoney - Assistant Secretary of Commerce for Oceans and Atmosphere and Deputy Administrator, NOAA

December 4, 2003 - Washington, D.C.

- Erin Wuchte - Budget Examiner for NOAA Atmospheric programs
- John Webb - Department of Commerce, Budget Office
- Everett Whiteley - NOAA, Budget Office

December 4, 2003 - Washington, D.C.

Telephone call with Thomas Kitsos - Executive Director, Ocean Commission

December 5, 2003 - Washington, D.C.

- Carolyn Thoroughgood - Chairing the Board of Consortium for Oceanographic Research and Education (CORE)
- Mark R. Abbott - Dean, College of Oceanic Atmospheric Sciences, Oregon State University
- Penelope D. Dalton - Vice President and Technical Director, CORE

December 5, 2003 - Washington, D.C.

- Conrad C. Lautenbacher Jr. - Vice Admiral, U.S. Navy (Ret.), Under Secretary of Commerce for Oceans and Atmosphere and NOAA Administrator
- Leonard J. Pietrafesa - Interim Chair, Science Advisory Board, Director of External Affairs, College of Physical and Mathematical Sciences, North Carolina State University

December 5, 2003 - Washington, D.C.

- Peter Bell - Chairman Sea Grant Review Panel, Retired Executive Vice President for Technology, St. Gobain Corporation
- Robert Stickney - Sea Grant Association, Director of Texas Sea Grant Program
- Ronald C. Baird - Director, National Sea Grant College Program

December 5, 2003 - Washington, D.C.

- James D. Baker - former NOAA Administrator

December 10, 2003 - San Francisco, California

American Geophysical Union (AGU) Fall Meeting - Informal Public Comment Session. Nineteen people attended the session.

December 16, 2003 - Washington, D.C

Meeting with House and Senate Appropriations staff

- Kevin Linskey
- David Pomerantz
- Amy Carroll
- Jean Fruci

January 6, 2004 - Washington D.C.

Science Advisory Board - Public Meeting

Science Advisory Board Members

- Leonard J. Pietrafesa - Interim Chair, Director of External Affairs, College of Physical and Mathematical Sciences, North Carolina State University
- Vera Alexander - Dean School of Fisheries and Ocean Sciences, University of Alaska
- David Blaskovich - Sales and Marketing Executive, Weather and Environmental Markets, IBM Corporation
- Otis Brown - Dean, Rosenstiel School of Marine and Atmospheric Science University of Miami
- Peter M. Douglas - Executive Director, California Coastal Commission
- Susan Hanna - Professor, Oregon State University
- Arthur E. Maxwell - Professor Emeritus, University of Texas
- Jake Rice - Canadian Stock Assessment Secretariat, Fisheries and Oceans Canada
- John T. Snow - Dean, College of Geosciences, University of Oklahoma
- Denise Stephenson-Hawk - Chairman, The Stephenson Group

NOAA Senior Staff in Attendance

- Conrad Lautenbacher Jr. - Vice Admiral, U.S. Navy (Ret.), Under Secretary of Commerce for Oceans and Atmosphere and NOAA Administrator
- John J. Kelly Jr. - Deputy Under Secretary, NOAA
- John E. Jones - Acting Assistant Administrator for National Weather Service
- Rick Rosen - Assistant Administrator for NOAA Research
- Greg Withee - Assistant Administrator for National Environmental Satellite Data and Information Service
- Rick Spinrad - Assistant Administrator for National Ocean Service
- William Hogarth - Assistant Administrator for National Marine Fisheries Service
- Mary Glackin - Assistant Administrator, Program Planning and Integration

January 14, 2004 - Seattle, Washington

Special session held at the annual meeting of the American Meteorological Society. One hundred and twenty-nine people attended this meeting.

January 23, 2004 - Washington, D.C.

- Scott Gudes - Senate Appropriations Staff

January 28, 2004 - Silver Spring, Maryland

Teleconference with Joint Institute Directors list:

- Mike Wallace - JISAO, Seattle, Washington
- Susan Avery - CIRES, Boulder, Colorado
- Bob Weller - CICOR, Woods Hole, Massachusetts
- Tom Vonder Haar - CIRA, Fort Collins, Colorado

February 3, 2004 - Washington, D.C.

- Christine Kojac - House Appropriations, Majority staff
- Annmarie Goldsmith - Department of Commerce
- Christine Maloy-Jacobs - NOAA

February 3, 2004 - Washington, D.C.

- John J. Kelly Jr. - Deputy Under Secretary, NOAA

Meeting with Assistant Administrators:

- Greg W. Withee - Assistant Administrator, National Environmental Satellite Data & Information Service
- John E. Jones - Acting Assistant Administrator, National Weather Service
- William Hogarth - Assistant Administrator for National Marine Fisheries Service
- Mary Glackin - Assistant Administrator, Program Planning and Integration

February 26 - 27, 2004 - Silver Spring, Maryland

Group and Individual meetings with:

- Daniel L. Albritton - Director, Aeronomy Laboratory
- Bruce B. Hicks - Director, Air Resources Laboratory
- Peter B. Ortner - Acting Director, Atlantic Oceanographic & Meteorological Laboratory
- Randall Dole - Director, Climate Diagnostic Center
- David J. Hofmann - Director, Climate Monitoring & Diagnostics Laboratory
- William D. Neff - Director, Environmental Technology Laboratory
- Alexander E. MacDonald - Director, Forecast Systems Laboratory
- Ants Leetmaa - Director, Geophysical Fluid Dynamics Laboratory
- Stephen B. Brandt - Director, Great Lakes Environmental Research Laboratory
- James F. Kimpel - Director, National Severe Storms Laboratory
- Eddie N. Bernard - Director, Pacific Marine Environmental Laboratory
- Ernest G. Hildner - Director, Space Environment Center

February 26, 2004 - Silver Spring, Maryland

Group meeting with Assistant Administrators or designees

- Stan Wilson - National Environmental Satellite Data & Information Service
- Jamie Hawkins - National Ocean Service
- General David L. Johnson - Assistant Administrator, National Weather Service
- Michael P. Sissenwine - Director, Northeast Fisheries Science Center, National Marine Fisheries Service
- Mary Glackin - Assistant Administrator, NOAA Program Planning and Integration

February 26, 2004 - Washington, D.C.

Group meeting at the Office of Management and Budget

- Erin Wuchte and Emily Woglom - Budget Examiners
- Christine Maloy-Jacobs - NOAA

February 26, 2004 - Washington, D.C.

Group meeting with NOAA Goal Team Leaders

- Chet Koblinsky - Climate
- Jack Hayes - Weather and Water
- Mike Sissenwine - Ecosystems
- Charlie Challstrom - Commerce and Transportation

March 11-12, 2004 - Boulder Colorado

Extensive meetings and discussions with the Council of Boulder Laboratory Directors, laboratory scientists, and employees working in the David Skaggs Research Center plus with Susan Avery, Director of CIRES (Joint Institute)

March 17, 2004 - Rosslyn, Virginia

Science Advisory Board Meeting - Open Forum

Science Advisory Board Members

- Leonard J. Pietrafesa - Interim Chair, Director of External Affairs, College of Physical and Mathematical Sciences, North Carolina State University
- Vera Alexander - Dean School of Fisheries and Ocean Sciences, University of Alaska
- David Blaskovich - Sales and Marketing Executive, Weather and Environmental Markets, IBM Corporation
- Peter M. Douglas - Executive Director, California Coastal Commission
- Susan Hanna - Professor, Oregon State University
- Arthur E. Maxwell - Professor Emeritus, University of Texas
- Jake Rice - Canadian Stock Assessment Secretariat, Fisheries and Oceans, Canada
- John T. Snow - Dean, College of Geosciences, University of Oklahoma
- Denise Stephenson-Hawk - Chairman, The Stephenson Group

NOAA Senior Staff in Attendance

- Tim Keene - Deputy Assistant Secretary of Commerce for Oceans and Atmosphere
- John J. Kelly Jr. - Deputy Under Secretary, NOAA

March 17, 2004 - Rosslyn, Virginia

- Bruce B. Hicks - Director, Air Resources Laboratory
- Richard Artz - Deputy Director, Air Resources Laboratory

April 6, 2004 - Washington D.C.

- Floyd Des Champs and Margaret Spring – Senate, Commerce, Science and Transportation Committee Staff
- Eric Webster, Amy Carroll and Jean Fruci -House Science Committee Staff

April 14, 2004 - Washington D.C.

Follow-up Teleconference with Joint Institute Directors from the January 28, 2003 call

April 14, 2004 - Washington D.C.

- Bob Frosch - Senior Research Fellow, Belfer Center for Science and International Affairs, John F. Kennedy School of Government

April 16, 2004 - Washington D.C.

- Dr. Mal O'Neill - Vice President and Chief Technical Officer, Lockheed Martin Corporation

April 16, 2004 - Washington, D.C.

- Conrad C. Lautenbacher Jr. - Vice Admiral, U.S. Navy (Ret.), Under Secretary of Commerce for Oceans and Atmosphere and NOAA Administrator
- James R. Mahoney - Assistant Secretary of Commerce for Oceans and Atmosphere and Deputy Administrator, NOAA
- John J. Kelly Jr. - Deputy Under Secretary, NOAA

April 16, 2004 - Bethesda, Maryland

- Richard Wyatt - National Institutes of Health (NIH)
- Anthony Demsey - National Institutes of Health (NIH)

May 18, 2004 - Washington, D.C.

- James R. Mahoney - Assistant Secretary of Commerce for Oceans and Atmosphere and Deputy Administrator, NOAA
- John J. Kelly Jr. - Deputy Under Secretary, NOAA
- Scott Rayder - NOAA Chief of Staff

May 18, 2004 - Washington, D.C.

- Otto Wolfe - DoC Chief Financial Officer and Asst Secretary for Administration

May 18, 2004 - Washington, D.C.

Meeting with House and Senate Appropriations staff

- Michael Ringler
- David Pomerantz
- Scott Gudes

May 24, 2004 – Washington, D.C.

Meeting with House Science Committee Staff

- Eric Webster
- Amy Carroll
- Stan Sloss (Rep. Udall's staff)

May 25, 2004 – Washington, D.C.

Meeting with Senate, Commerce, Science and Transportation Committee Staff

- Margaret Spring
- Danielle Renart

Appendix IV
NOAA Laboratories and Joint Institutes

NMFS LABORATORIES
- Alaska Fisheries Science Center - 2 Field Stations
- Northeast Fisheries Science Center - 4 Field Stations
- Northwest Fisheries Science Center - 5 Field Stations
- Southeast Fisheries Science Center - 4 Field Stations
- Southwest Fisheries Science Center - 2 Field Stations
- Pacific Islands Fisheries Science Center - 1 Facility

NMFS JOINT INSTITUTES

NESDIS LABORATORIES
- Center for Satellite Applications and Research

NESDIS JOINT INSTITUTES
- Cooperative Institute for Climate Studies
- Cooperative Institute for Oceanographic Satellite Studies
- Cooperative Institute for Meteorological Satellite Studies

NOS LABORATORIES
- Center for Coastal Fisheries and Habitat Research (including Beaufort, NC and Kasitsna Bay, AK)
- Center for Coastal Monitoring and Assessment
- Center for Sponsored Coastal Ocean Research
- Center for Environmental Health and Biomolecular Research
- Hollings Marine Laboratory
- Oxford Cooperative Laboratory
- Coast Survey Development Laboratory

NOS JOINT INSTITUTES
- Cooperative Institute for Coastal and Estuarine Environmental Technology (CICEET)
- Joint Hydrographic Center

NWS LABORATORIES
- Environmental Modeling Center
- Meteorological Development Laboratory
- Office of Hydrological Development

NWS JOINT INSTITUTES

OAR LABORATORIES
- Aeronomy Laboratory
- Air Resources Laboratory
- Atlantic Oceanographic and Meteorological Laboratory
- Climate Diagnostics Center
- Climate Monitoring and Diagnostics Laboratory
- Environmental Technology Laboratory
- Forecast Systems Laboratory
- Geophysical Fluid Dynamics Laboratory
- Great Lakes Environmental Research Laboratory
- National Severe Storms Laboratory
- Pacific Marine Environmental Laboratory
- Space Environment Center

OAR JOINT INSTITUTES
- Cooperative Institute for Arctic Research (CIFAR)
- Joint Institute for Marine Observations (JIMO)
- Cooperative Institute for Research in the Atmosphere (CIRA)
- Cooperative Institute for Research in Environmental Sciences (CIRES)
- Cooperative Institute for Marine and Atmospheric Studies (CIMAS)
- Joint Institute for Marine and Atmospheric Research (JIMAR)
- Cooperative Institute for Climate and Ocean Research (CICOR)
- Cooperative Institute for Limnology and Ecosystems (CILER)
- Cooperative Institute for Atmospheric Sciences and Terrestrial - Applications (CIASTA)
- Cooperative Institute for Mesoscale Meteorological Studies (CIMMS)
- Joint Institute for the Study of the Atmosphere and Ocean (JISAO)
- Cooperative Institute for Climate Sciences (CICS)
- Cooperative Institute for Climate Applications and Research (CICAR)

Note: In April 2004, the NOAA Line Offices provided this updated list of laboratories and Joint institutes. The Laboratories now total 29 and the Joint institutes total 18.

Appendix V
DoD Financial Management 6.1-6.7 System

Budget Activity	Title	Brief Description
6.1	**Basic Research**	Systematic study directed toward greater knowledge or understanding of the fundamental aspects of phenomena and of observable facts without specific applications towards processes or products in mind
6.2	**Applied Research**	Systematic study to understand the means to meet a recognized and specific national security requirement
6.3	**Advanced Technology Development**	Development of subsystems and components and efforts to integrate subsystems and components into system prototypes for field experiments and/or tests in a simulated environment
6.4	**Advanced Component Development and Prototypes**	Efforts necessary to evaluate integrated technologies, representative modes or prototype systems in a high fidelity and realistic operating environment
6.5	**System Development and Demonstration**	Engineering and manufacturing development tasks aimed at meeting validated requirements prior to full-rate production
6.6	**Research, Development, Testing and Evaluation Management Support**	Efforts to sustain and/or modernize installations or operations
6.7	**Operational System Development**	Development efforts to upgrade systems that have been fielded or received approval for full rate production and anticipate production funding in the current or subsequent fiscal year.

Source for this table is DoD Financial Management Regulation (DoD 7000.14-R, Volume 2B, Chapter 5), June 2002 (http://www.dod.mil/comptroller/fmr/)

Appendix V.A
Technical Readiness Level

Technical Readiness Level (TRL)	Description
1. Basic principles and broad vision of the system observed and reported.	The most general discussion of the system, i.e., the lowest level of resolution in system analysis. It corresponds to the lowest level of technology readiness. The results of this level of analysis are usually presented as paper studies of a system's basic properties. Correspondingly, it is also the lowest level of software readiness. Basic research begins to be translated into applied research and development.
2. Conceptual design of a system and/or technology and its application formulated.	Beginning of the system's refinement: resolution grows. Key engineering solutions are proposed, innovations are introduced, key resource limits are chosen. Practical applications are invented and tested. Applications are partially tested, partially hypothesized, and there may be no exhaustive proof or reliable analysis to support the assumptions and visions of the developing team.
3. Thorough theoretical and experimental critical analysis of system's function; detailed characteristic proof of concept.	More detail is addressed. Active research and development are initiated. Theoretical studies are conducted in the laboratory targeting physical and/or computational (simulation) validation of analytical predictions for separate sub-systems of the system. Those sub-systems are being scrutinized that are innovative and have not been integrated. Similar active research and development is initiated for the software subsystems. The number of resolution levels must be properly chosen. The programs are written that can validate theoretical predictions for separate software subsystems. Algorithms are tested in laboratory environment or in simulation.
4. Component and/or breadboard validation is conducted in the laboratory environment.	All basic subsystems and components are integrated to establish that they will work together. This usually includes ad hoc sub-systems integration. This includes integration of software components are integrated to determine how they will work together. They are relatively primitive with regard to efficiency and reliability compared to the eventual system. System Software architecture development initiated to include interoperability, reliability, maintainability, extensibility, scalability, and security issues. At this point, we are able to check the matching between computational parameters of the algorithms and programs on one hand and the parameters of other components (sensors, actuators) on the other.
5. Component and/or breadboard validation in more realistic relevant environment.	Fidelity of breadboard technology increases significantly. The basic technological components are integrated with reasonably realistic supporting elements: it includes "high fidelity" ("high resolution") laboratory integration of software components. Configuration control is initiated. Verification, Validation, and Accreditation (VV&A) initiated. At this point, we have an opportunity to check whether the state-space is tessellated properly, whether the parameters of sampling, or parameters of randomization are proper ones.

Technical Readiness Level (TRL)	Description
6. System/subsystem model or prototype demonstration in a relevant environment.	Representative model or prototype system, which is well beyond that of TRL 5, is tested in a relevant environment. Represents a major step up in a technology's demonstrated readiness. Examples include testing a prototype in a high-fidelity laboratory environment or in a simulated operational environment. This stage represents a major step up in software-demonstrated readiness. Software support structure is in development. VV&A is in process. At this stage we check the value of parameters such as carrying frequencies, bandwidths, etc.
7. System prototype demonstration in an operational environment.	Prototype near, or at, planned operational system. Represents a major growth in resolution comparatively with TRL 6, requires demonstration of an actual system prototype in an operational environment such. Examples include testing the prototype in a test bed aircraft. Software support structure is in place. Software releases are in distinct versions. Frequency and severity of Software deficiency reports do not significantly degrade functionality or performance. VV&A completed.
8. Actual system completed and qualified through test and demonstration.	The system has been proven to work in its final form and under expected conditions. In almost all cases, this TRL represents the end of the system development. Examples include developmental test and evaluation of the system in its intended application to determine if it meets design specifications. Software has been demonstrated to work in its final form and under expected conditions. In most cases, this TRL represents the end of system development. Examples include test and evaluation of the Software in its intended system to determine if it meets design specifications. Software deficiencies are rapidly resolved through support infrastructure.
9. Actual system proven through successful mission operations.	Actual application of the technology in its final form and under mission conditions, such as those encountered in operational test and evaluation. Examples include using the system under operational mission conditions. Actual application of the Software in its final form and under mission conditions, such as those encountered in operational test and evaluation. In almost all cases, this is the end of the last debugging aspects of the system development. The system is used under operational mission conditions. Software releases are production versions and configuration controlled.

Appendix VI

Office of Oceanic and Atmospheric Research—Success Stories

TRANSITION OF RESEARCH TO OPERATIONS

Foundation for the National Weather Service Modernization: For the past 30 years, OAR has provided the scientific and technological foundation for major technological infusions supporting the largest modernization effort in the history of the National Weather Service (NWS). In the 1970s, OAR recognized the potential for Doppler radar to improve the detection and warning of severe weather, which led to the development and deployment of the Next Generation Weather Radar program (NEXRAD). This resulted in the creation of a critically important national network of Doppler radars. Another major component underpinning the modernization of the NWS was the research and development carried out in OAR laboratories and Joint Institutes (starting 1998), which led to the delivery of the Advanced Weather Interactive Processing System (AWIPS). This system revolutionized the delivery and use of weather information at forecast offices across the nation. These improvements have all been successfully transferred to the NWS.

Deployment of the Warning Decision Support System in the 1990s has led the evolution of severe storm weather warnings for the past ten years. The recently deployed Open Radar Product Generator (ORPG) builds on these capabilities, and is expected to continue improvements. The ORPG is the part of NEXRAD that processes raw data gathered by radar, performs data quality checks, creates radar images and products for display, and sends those products to display systems such as AWIPS used by NOAA's NWS. OAR is also looking to advance lead time significantly beyond 2007 levels for tornadoes and improve flood warning capability, by working with the NWS to upgrade the existing WSR-88D (NEXRAD) radar network to a dual polarization radar network.

Building on the Success and Systems of the NWS Modernization: OAR's efforts in support of Phased Array Radar development are looked to as the best candidate to underpin the next generation of radar advancements; the advancements are designed to help future forecasters provide earlier warnings for tornadoes and other types of severe and hazardous weather. This new, state-of-the-art radar was unveiled in 2003 at NOAA's National Severe Storm Laboratory (NSSL) in Norman, Oklahoma, thereby establishing the National Weather Radar Testbed. This testbed provides the meteorological research community with the first full-time phased array radar facility.

Advancements Lead to More Timely Tornado Warnings: The lead-time for NWS tornado warnings in 1987 was three minutes. OAR investments in new radar and software technologies helped deliver tornado warning lead times of 15 minutes in 2003. These advances were extremely helpful during the Midwest tornado outbreak from May 4-10 2003. With approximately 400 tornadoes reported during this period, the NWS was able to issue tornado warnings with an average lead-time of 18 minutes.

Improvements in Hurricane Track and Intensity Forecasts: NOAA and the Joint Institutes have made continuous improvements in hurricane track and intensity forecasts. $2.5B in damage costs is saved annually, on average, because of more accurate hurricane watches and warnings. OAR provides core modeling advances in support of NWS hurricane predictions. Numerous improvements made by OAR have led to a 20 percent improvement in intensity and track forecasts. NOAA and Joint Institute scientists were instrumental in developing observational advances (e.g., dropwindsonde) necessary to obtain detailed measurements of low-level hurricane eyewall winds. The data collected during these missions improved the one- and two-day model track forecasts by an average of 13 percent, and longer-range forecasts by up to 32 percent. Some evidence suggests that the aircraft-dropwindsonde data have an even larger positive impact on track forecasts for strong or rapidly intensifying storms. Improvements in tracking hurricanes have been demonstrated in the past year; the accuracy of the 2003 Hurricane Isabel forecast, and the skill at forecasting hurricanes in the entire 2003 season, is a true NOAA accomplishment. In 2003, verification of Isabel was much better than the 10-year average. The average 48-hour track error for Isabel was only 60 nautical miles (nm); and the 5-day forecast was as reliable as the 3-day forecasts provided for similar hurricanes 15 years ago. The recent advancements in hurricane forecasting are a result of better partnerships between researchers and forecasters, better use of observations in models, and improved model physics.

Science Supports New Ozone Forecasts: NOAA and the Environmental Protection Agency signed an agreement to deliver air quality forecasts to the Nation. The transfer of this information to the NWS is now completing the first stages; the NWS will begin providing 24-hour ozone forecasts in New England in the fall of 2004. OAR science is the foundation of these forecasts and will contribute to the future development of nationwide ozone and fine particle forecasts. Ongoing OAR activities in research-grade air pollution observations, intensive field studies to understand photochemical processes in the atmosphere, and diagnostic and predictive modeling make the development and implementation of operational air pollution forecasts possible.

Tsunami Hazard Mitigation: Advanced computer models, tsunami inundation maps, tsunami detection buoys, an expanded seismic network, evacuation signs, educational videos, and mitigation plans are all products of the NOAA National Tsunami Hazard Mitigation Program. The five-state/three- federal agency program was created in 1996 after a small local tsunami was generated in northern California that raised concerns about the tsunami threat to the west coast. To reduce the 75 percent false alarm rate of tsunami warnings, a breakthrough technology, to detect tsunamis in the deep ocean in real-time, was developed. Six deep-water tsunami detection buoys are now deployed in earthquake-prone areas off Alaska, the U.S. west coast, and Chile. The $10 million investment in this new tsunami warning capability is already paying big dividends; tsunami data received in November 2003 following a magnitude 7.5 Alaskan earthquake convinced officials in Hawaii that the tsunami was not destructive, leading to the quick cancellation of the warning. The timely cancellation averted a false alarm evacuation that saved Hawaii an estimated $68 million. The tsunami program was successfully transferred to the

NWS in 2003. The tsunami detection network will consist of 20 deep-water buoys when it is completed in 2011.

Transportation on the Great Lakes: NOAA researchers are expected to decrease error in their six-month Great Lakes level forecasts by 1 cm by 2007. The shipping industry is highly sensitive to small changes in lake levels. A two-centimeter error in a forecast can translate into a loss of $1.5 million for one ship carrying cement over the course of one year. With the incorporation of real-time water level measurements, precipitation (Doppler radar derived), air temperature, wind speed, cloud cover, and humidity, the models developed by NOAA scientists provide improved forecasting over traditional water level forecasting models. These forecasts are operational at the U.S. Army Corps of Engineers, the New York Power Authority, and several universities. In addition to the shipping industry, hydropower plants use the forecasts extensively to plan their peaking and ponding operations.

Understanding Our Global Climate System to Improve Short-Term Climate Prediction: Using a combination of numerical modeling and data from its El Niño observing system, NOAA successfully monitored the largest El Niño event on record in 1997/8 and predicted its evolution in the tropical Pacific several months in advance. This allowed for the successful prediction of the subsequent shift to a La Niña cold phase, resulting in major changes to U.S. weather patterns during the winter of 1997-8. Predictions such as these had their genesis in the coupled (ocean/atmosphere) global climate models developed by OAR Laboratories and Joint Institutes, recognized as world leaders in modeling the complex physical processes that govern the behavior of the atmosphere and oceans. Through the generation of large ensemble data sets that are based upon historical data, NOAA and Joint Institute researchers have also been able to better assess the affects of El Niño climate events on regions outside of the tropics, where the El Niño signal has been more difficult to track. Since 1997-8, OAR has reached new heights in increasing the skill of NWS operational seasonal forecasts. These improvements are being made through better understanding of the physics of variability and through better predictions using numerical models. OAR plans to systematically introduce model outputs from five models into NWS operations over the next five years. In addition, OAR's experimental sub-seasonal forecast products for 8-14 day temperature and precipitation and tropical Pacific rainfall variability will be implemented in an operational framework by NWS before October 2004.

Regional Ecological Observing System Data Supports Management Responsibilities: OAR laboratories on both coasts and in the Great Lakes have collected physical and biological ocean and lake parameters in the Gulf of Alaska/Bering Sea, Florida Bay/Florida Keys and Great Lakes regions for more than 20 years. These observations are incorporated into fisheries forecasts, protected species management models, models to predict lake levels, tsunami preparation, and to gauge the success of coastal habitat restoration efforts. One such program, initiated in the North Pacific Ocean in 1984, produced its first annual recruitment forecast for walleyed Pollock in 1992. Pollock is the largest component of the lucrative Alaskan groundfish industry, which comprises 47 percent of the entire U.S. fish catch by weight. These forecasts are provided to the

National Marine Fisheries Service as part of the input used by the North Pacific Fisheries Management Council to establish quotas.

Space Environment Center: OAR provided the foundation for the development of the Space Environment Center (SEC), which provides real-time monitoring and forecasting of solar and geophysical events, conducts research in solar-terrestrial physics, and develops techniques for forecasting solar and geophysical disturbances. SEC's Space Weather Operations Center is jointly operated by NOAA and the U.S. Air Force and is the national and world warning center for disturbances that can affect people and equipment working in the space environment. The center will be transferred to the NWS in FY 2005.

RESEARCH PROVIDING INFORMATION SERVICES

Acid Precipitation: Ongoing air quality assessments based on field studies and diagnostic modeling provides crucial scientific information to support decisions of policy makers. In the 1980s and 1990s, NOAA scientists made major contributions to the National Acid Precipitation Assessment Program's scientific assessments of the causes of acidic deposition, providing a firm scientific foundation for the acid rain control provisions of the 1990 Clean Air Act Amendments.

Air Quality Management: NOAA's air quality research provides scientific input into the development of scientifically effective management strategies. Discoveries NOAA made in 2000 allowed the State of Texas to develop a less onerous pollution control strategy that protects public health while projecting to save the state more than $9B and 64,000 jobs by 2010.

Homeland Security: Building on capabilities delivered over several decades (starting with volcano dispersion plume simulations), OAR scientists created UrbaNet, a dedicated turbulence measuring system deployed in Washington, D.C., New York City, and Las Vegas, providing decision makers with specialized forecasting of atmospheric dispersion in the event of a terrorist attack.

Discovery of the Underlying Causes of Our Depleted Ozone Layer: Conclusive evidence of stratospheric ozone depletion over Antarctica was gathered in the mid-1980s. Subsequent National Ozone Expeditions to Antarctica in 1986-1987 were led by an OAR scientist and confirmed that depletion of the ozone layer is caused by human-produced chlorofluorocarbons interacting with polar stratospheric clouds. These discoveries led to the strengthening of major international agreements, such as the Montreal Protocol, to phase-out the wide use of these compounds. Recent scientific assessments have led to an accelerated schedule of phase-outs, new caps on other ozone depletors, and trade limits on ozone-depleting chemicals. NOAA has led the preparation of the state-of-the-science assessments for the United Nations, and an OAR scientist serves as Scientific Advisor to the Montreal Protocol.

OAR has been pivotal in understanding and describing the atmospheric processes that caused the unexpected occurrence of the Antarctic ozone hole and, more recently, the linkages between the ozone hole and climate in the Antarctic region. OAR scientists published the first and a subsequent series of award-winning papers documenting and dissecting the rise, turnover, and decline of ozone-depleting gases in the atmosphere. These publications were based upon the unique, long-term measurements made globally by OAR and Joint Institutes and underscore the significance of human activities in the rise, and now decline, of these gases in the atmosphere.

Almost since the study of the thinning ozone layer began, OAR scientists have been the reliable source of information about the ozone-layer friendliness and climate friendliness of substitute chemical compounds that industry proposes for a variety of societal uses such as refrigeration, air conditioning, electronics manufacture, and fire protection. These scientists carried out laboratory and modeling evaluations of more than a dozen substances and gained OAR the reputation among industries and governments as the main source for information.

Explaining and Predicting Impacts of Global Carbon Dioxide Increases: A four-station Baseline Observatory network operated by OAR has provided the world with a continuous record of the increase in global atmospheric carbon dioxide (CO_2) over the past 40 years. These observations, combined with samples collected globally through a cooperative flask-sampling network at about 50 sites, contribute to about 85 percent of a global atmospheric CO_2 database compiled by OAR. The database serves as a world-renowned source of CO_2 data for climate modeling. In 1990, OAR scientists used the global network data to show that there was a large, previously unknown, amount of CO_2 being taken up by the terrestrial biosphere (trees, plants, soils) in the Northern Hemisphere. This discovery of major "free sequestration" of carbon by the biosphere provided impetus for the current North American Carbon Program (NACP), an interagency/university research program designed to study carbon sources and sinks in North America and surrounding ocean basins. As a part of this program, OAR is building a network of aircraft and tall tower CO_2 monitoring stations across North America to determine the interannual variability of U.S. and North American carbon uptake.

OAR has also made dramatic strides in understanding how the land and oceans buffer anthropogenic emissions of CO_2 to the atmosphere. The first database inventory of anthropogenic CO_2 in the ocean was compiled by OAR scientists, documenting that the oceans alone have absorbed 29% of the excess CO_2 produced by human activity since the start of the industrial revolution. The annual oceanic uptake of CO_2 represents a $4B annual carbon sequestration "service."

NOAA researchers have also contributed to the first climatology of surface ocean CO_2 levels through measurements from NOAA research ships. Through targeted studies, NOAA researchers have improved calculations of CO_2 fluxes between the atmosphere and the ocean. The resulting "maps" are used in models and as a baseline for CO_2 flux anomalies resulting from phenomena such as El Niño. The monthly climatologies have been one of the most important contributions to oceanic and atmospheric carbon cycle studies in the last decade.

Intergovernmental Panel on Climate Change and OAR Citations: OAR continues to provide scientific understanding to inform the policy-making process in the global climate change arena as noted in the proceedings of the Intergovernmental Panel on Climate Change (IPCC). Citations in these critical assessments are a key gauge of the value of research. For each of the three completed IPPC Assessments, OAR boasts the following increasing numbers of citations of its scientists: 67 (1990), 131 (1995) and 295 (2001). An OAR senior scientist is the Chair of Working Group 1 for the 2007 IPCC Assessment. OAR contributions in carbon cycle research, greenhouse gas monitoring, aerosols characterization, radiative forcing understanding, and a coupled atmosphere, land, ice, and ocean model will all be used in the forthcoming 2007 IPCC Report.

A Measure of the High Impact of OAR Scientists in the Geosciences: OAR scientists are prominent in the listing of "The World's Most Influential Researchers" in the geosciences over the period 1981-1999, compiled by ISI Thompson Scientific by tracking citations of publications in the international scientific literature. Of the ten NOAA scientists on the list of most highly cited, nine are from OAR. Researchers on the list are considered to have formed or changed the course of research on a subject. The result provides a measure of OAR's very high impact in the geosciences.

Appendix VII
Extramural Research Success Stories

Climate Outlooks and Predictions: The extramural research community and Joint Institutes helped form the concept and methodology for seasonal-to-annual climate prediction with research on El Niño Southern Oscillation (ENSO), North Atlantic Oscillation (NAO), Pacific Decadal Oscillation (PDO), coupled atmosphere-ocean modeling, and statistical methods for data analysis. NOAA's Office of Global Programs (OGP) Tropical Ocean Global Atmosphere (TOGA) fieldwork, a major coordinated observational campaign, paved the way for ENSO climate predictions. This research took a decade to mature to forecasts that are now regular operational products from the Climate Prediction Center (CPC) at NOAA's National Center for Environmental Prediction (NCEP). Similar work is now under way on other climate patterns that will eventually improve our ability to provide accurate climate outlooks on longer time scales. The ENSO forecast likely is the single most important event that launched NOAA into predictive climate services.

Climate Services: The Cooperative Institute for Research in Environmental Sciences (CIRES) and Joint Institute for the Study of the Atmosphere and Ocean (JISAO) as well as three other university locations, have extensive contacts with managers responsible for water resources management, flood control, power generation, fisheries, forest resources, agriculture, and wildland fire. These managers are all potential users of seasonal to decadal climate forecasts and outlooks. By talking to these individuals, it is learned what kinds of climate services might benefit various sectors of the economy and how climate information can be tailored. Specific products that have been developed include new hydrometeorology forecasting tools, snowmelt products, new climate division analyses, improved fire-management decision models, and crop outlooks.

Multi-institutional Programs: The development of a center of excellence in meteorological radar engineering and radar meteorology in Norman, OK is the result of collaboration between NOAA's National Severe Storms Laboratory, four different units within the University of Oklahoma, and the private sector. The hinge for this collaboration is the Cooperative Institute for Mesoscale Meteorological Studies (CIMMS), the NOAA Joint Institute that links NOAA with the university. Central to the effort is the adaptation of the SPY-1 Phased Array Radar of the U.S. Navy for meteorological applications. NSSL provides the scientific and engineering leadership for this initiative, with strong support from CIMMS scientists and engineers who team the NSSL federal employees. Faculty members from the OU schools of Meteorology and Electrical and Computer Engineering also contribute. Both schools are adding five new faculty members to strengthen the effort. The State of Oklahoma is fully funding these new positions at a time of constrained state budgets. The private sector is an additional partner, including Lockheed Martin and Basic Commerce and Industries (BCI). Lockheed Martin supports the OU School of Electrical and Computer Engineering to nurture its radar-engineering program. Complementing the SPY-1 initiative is the development of low-powered short-range radars by

the new National Science Foundation Engineering Research Center (CASA) in which the OU Center for the Analysis and Prediction of Storms is a major partner. These small-scale radars will work with the scans of the SPY-1 radar and contribute to more local severe-weather warnings.

Hawaiian Long-Line Fishery: On April 1, 2004, the Hawaiian long-line fishery was reopened after a two-year closure by the Federal courts. The fishery was closed because of concerns about incidental catch (by-catch) of protected species, especially sea turtles. The Joint Institute for Marine and Atmospheric Research (JIMAR) participated in collaborative research with the Pacific Islands Fisheries Science Center and provided funding through JIMAR's Pelagic Fisheries Research Program to a suite of national and international researchers to address issues related to by-catch. Direct outcomes of these efforts have included development of the design of hooks and techniques of setting lines that contributed to the reopening of the fishery.

Hurricane Intensity Forecasting: The exchange of heat and momentum at the air-sea interface plays a critical role in hurricane development. Work at Cooperative Institute for Marine and Atmospheric Studies (CIMAS), in cooperation with NOAA Atlantic Oceanographic and Meteorological Laboratory (AOML) uses radar altimeter data to estimate oceanic heat content coupled with the seasonal climatology in the Atlantic Ocean Basin. These are used daily to make intensity forecasts using the Statistical Hurricane Intensity Prediction Scheme (SHIPS) model at the National Hurricane Center. This has led to improved intensity forecasts by more than 5 percent. These oceanic heat content data are now a key element in the data stream for hurricane forecasts. Research in this area was begun under a program supported by Office of Naval Research (ONR). After various field programs validated the procedure, the research was assumed under NOAA support through CIMAS.

Ocean Observations: Woods Hole Oceanographic Institution (WHOI) was a central player in development of the Argo profiling ocean floats. WHOI now builds and deploys them for the NOAA Climate Observation Program and, with partners at the Scripps Oceanographic Institute (SOI), is at the forefront of using such technology to observe, understand, and better predict the evolving state of the ocean and its role in climate variability. WHOI also has the premier expertise and track record in unattended, moored observations in the water column and at the sea surface, developed over many years with support from the Office of Naval Research and the National Science Foundation. WHOI now builds and deploys ocean reference stations at key locations for the NOAA Climate Observation Program and has taken a lead role in using these surface moorings and similarly instrumented ships to obtain more accurate quantification of the air-sea exchanges of heat, freshwater, momentum, and other properties important to climate variability. The new understanding of the air-sea exchanges will support much improved predictions of oceanic variability and of inter-annual (ENSO), decadal (North Atlantic Oscillation, for example), and longer time scale variability. Cooperative Institute for Climate and Ocean Research (CICOR), the Joint Institute at WHOI, makes WHOI research facilities available to NOAA and NOAA-funded scientists. WHOI's ships with global capability, *Knorr* and *Atlantis*, the manned submersible *Alvin* (cooperatively funded by NSF, NOAA's National

Undersea Research Program (NURP) and the Navy), WHOI's unmanned submersibles, and WHOI's regional research ship *Oceanus* work in support of NOAA research, adding capability and capacity not found in NOAA's fleet.

Land Dynamics and Biogeochemistry: Extramural research has the lead in developing the physical as well as biological components of a new land model for Geophysical Fluid Dynamics Laboratory (GFDL) Earth system model including vegetation and hydrology, with ongoing work to add nutrient cycling in agricultural areas and forests. Research includes the impact of land surface processes on climate prediction on time scales from months to centuries, the dynamics and simulation of drought, changes in the sizes of terrestrial carbon sources and sinks, changes in the distribution of biomes, effects of vegetation and land use change on the hydrologic cycle, and effects on human activities; air quality impacts of changes in biogenic volatile organic compounds (BVOC) emissions and their influence on surface ozone.

Chemistry, Radiation, and Climate: Graduate students led the way in developing an improved representation of aerosols in Geophysical Fluid Dynamics Laboratory's (GFDL) new Earth system model and understanding of their role in climate, including representations of the role of indirect forcing; studies of hygroscopic and optical properties of organic carbon; studies of the effects of volcanic aerosols on tropospheric climate and the Arctic Oscillation; analyses of water vapor feedback effects; analyses of cloud microphysics-radiation interactions; studies of the climate sensitivity due to trace gases versus aerosols; and theoretical studies guided by observations on the effects of aerosol plumes on cloud properties highlighting the importance of size distribution and chemical composition in the effects of aerosols on climate.

Education and Training: Under the Joint Institute Program, Sea Grant, National Undersea Research Program (NURP), and Ocean Explorer programs, there is a long term and highly successful program of training post-doctoral students, graduate students, and undergraduate students. Many of these former students now play major roles as faculty members and researchers around the world, including many in NOAA and other national laboratories. These training programs provide opportunities for hundreds of young scientists annually to engage in NOAA-focused research and often provide the means to work across disciplines or provide the mechanism for transitioning research into information or operational services.

NOAA's Educational Partnership Program with Minority Serving Institutions provides financial assistance to minority-serving academic institutions to support collaborative research and training of students in NOAA-related sciences through competitive processes. The goal is to increase the number of students who are trained and graduate in sciences directly related to NOAA's mission. It also seeks to increase collaborative research efforts between NOAA scientists and researchers at Minority Serving Institutions, as defined by the Department of Education. Since 2001, 19 students have been hired as full-time NOAA employees, and more than 300 students have received training in programs supported by the Educational Partnership Program.

Investment in Marine Aquaculture: Through its investments in off-shore aquaculture in such areas as Hawaii, Florida/Puerto Rico, New Hampshire, the Gulf of Mexico, and the mid-Atlantic, NOAA Sea Grant hopes to establish an environmentally sustainable, profitable offshore aquaculture industry in the United States and the Caribbean. In addition to creating a major source of global food production, investments by NOAA in marine aquaculture help alleviate stress on natural stocks, create jobs, and address the U.S. trade deficit. For example, the University of Hawaii Sea Grant College Program has been instrumental in the development of a strong aquaculture enterprise in the Hawaiian Islands. There are currently 126 farms valued at $25.2 million dollars, translating into about 630 jobs.

Life-Saving Products from the Sea: Biotechnological research conducted by NOAA Research-supported scientists has revealed candidates for new drugs and treatments from the sea that can be used in the fight against a wide range of human ailments, including cancer and AIDS. In addition to revolutionizing modern scientific theory about the origin and sustenance of life, the discovery of undersea hydrothermal vents and seeps in the 1980s has fueled the hope that sources of badly-needed new antibiotics lay in oceanic microbial communities just off our coasts. Sea Grant scientists and researchers from NURP's National Institute for Undersea Science and Technology have discovered and described more than 1,000 compounds. One compound, a set of peptides (called halovirs), was recently discovered in a marine-derived fungus and found to suppress replication of the herpes virus in marine mammal cells. Another compound, bryostatin 1, is expected to be approved for treating esophageal cancer. Sustained support of these scientific efforts from NOAA Research and others means that these new drugs may become available within the decade.

Discovery: NOAA's 2003 Ocean Exploration Ring of Fire expedition in the Western Pacific Ocean mapped more than 36,000 kilometers of seafloor and surveyed more than 50 submarine volcanoes, discovering that 10 of them had active hydrothermal systems. One of their main objectives was to characterize the biology and chemistry of the hydrothermal systems. The hydrothermal systems of submarine volcanoes along island arcs are relatively unexplored. Preliminary work at a few sea-floor sites and analyses of samples indicate that island arc hydrothermal systems are probably very different in character (e.g., morphology, eruptive style, chemical composition) from those found along the mid-ocean ridge. This expedition is one of the first comprehensive investigations of this type of submarine volcanic environment.

Innovation: NOAA's Undersea Research Program (NURP) provides scientists with the ability to live and work for up to 10 days at 60 feet beneath the ocean's surface in the world's only undersea laboratory, *NOAA's Aquarius*. The *Aquarius* is owned by NOAA and operated by the NURP Center at the University of North Carolina at Wilmington, one of six university-based NURP Centers, each of which supports competitive scientific proposals that target coastal and ocean resource science and management issues. *NOAA's Aquarius*, located in the Florida Keys National Marine Sanctuary, is a national asset that supports scientists in their efforts to better understand coral reef ecosystems. Science achievements from *NOAA's Aquarius* include research related to the damaging effects of ultraviolet light on coral reefs, geological studies that

use fossil reefs to better understand the significance of present-day changes in coral reefs, research that is rewriting the book on how corals feed, water quality studies that evaluate sources of pollution, and long-term studies of reefs to help distinguish between changes caused by natural system variability and humans.

Invasive Species Control: Sea Grant universities conducted an aquatic invasive species (AIS) survey in the Great Lakes to assess and improve the effectiveness of AIS boater education by Sea Grant and collaborating agencies and organizations. The survey was developed to measure boater attitudes and behavior in five freshwater and marine states. This is the first time a study has compared the efficacy of AIS boater awareness programs in different regions of the U.S. The survey demonstrated that investment in AIS public education can significantly change boater behavior to prevent and slow the spread of AIS. This finding has helped many states, provinces and task forces to justify expending limited resources for AIS boater education, because results show a return on this investment. The survey also identified the best methods to reach boaters and change their behavior. Outcomes of the study were presented at 16 conferences, workshops and meetings reaching 893 policy makers, resource managers, researchers and educators in five states. Additional are already planning to adapt the survey for their use. Working from the existing survey will save roughly 70 percent of the overall survey costs for the sponsoring organization.

Coastal Health and Water Quality: Using radioisotope data, Sea Grant researchers have found concentrations of DDT and PCBs in a Southern California water column that are 100 to 1,000-fold higher than the current limiting concentrations for effluents set by the State Water Resources Control Board. Their methods have been adopted by the Southern California Coastal Water Research Project and the Department of Earth Sciences at USC, resulting in approximately 155 person hours saved per month (equivalent to one full-time employee). Sea Grant researchers are also working on better ways to study the protozoans *Giardia* and *Cryptosporidium,* which sicken thousands of people, some fatally. The researchers are studying the pathogens in water, using laser traps and a fluorescent oxidation-reduction (redox) dye that enables them to visualize the respiration of the cysts. This new technique, which improves upon current technologies, is capable of trapping cells or particles at certain depth in an aquatic environment, thus allowing researchers to perform observations in real time under natural conditions. A commercial laboratory, Waterborne, Inc. (New Orleans, LA) has tested the method for potential commercial use and marketing.

Appendix VIII
OAR Boulder Laboratories

FY 2003 Funding and Staffing

Laboratory Name	Total Funding ($ in Millions)	Staffing Demographics Federal	Contractors	JI/others	Total Staffing
Aeronomy Laboratory	$14.5	40.6	0.5	59.3	100.4
Climate Diagnostics Center	$5.7	14.0	0.0	42.0	56.0
Climate Monitoring & Diagnostics Lab.	$14.3	51.0	4.0	42.0	97.0
Environmental Technology Laboratory	$15.6	55.0	16.8	35.3	107.1
Forecast Systems Laboratory	$28.1	88.0	57.0	58.0	203.0
Space Environmental Center 1/	$7.9	46.0	0.0	12.0	58.0
BOULDER TOTALS	$86.1	294.6	78.3	248.6	621.5

1/ The Space Environmental Center is proposed to be transferred to the National Weather Service in the FY 2005 President's Budget.

AERONOMY LABORATORY

Mission

The mission of the Aeronomy Laboratory (AL) is to improve the understanding of the chemical, dynamical and radiative processes of the Earth's atmosphere that are needed to improve NOAA's capability to predict its behavior. The chemical, dynamical, and radiative processes of the atmosphere are the mechanisms of atmospheric change. As such, their identification and characterization are a fundamental necessity for building better models for predicting the behavior of regional and global phenomena, which is at the heart of NOAA's mission.

- The Aeronomy Laboratory currently focuses on understanding the atmospheric processes important to model predictions of changes in climate, regional air quality, and the stratospheric ozone layer.
- In this user information context, Aeronomy Lab scientists conduct investigations of the atmospheric process under controlled conditions in the laboratory, carry out field measurements in a variety of environments, and use diagnostic models for analyses and interpretations.
- The Aeronomy Laboratory also assesses the current state of scientific understanding and interacts with those who use this information both within NOAA and elsewhere.

Brief History

The Aeronomy Laboratory was formed in 1965. Over AL's nearly 40-year history, its research has evolved to meet a sequence of most-pressing national needs for scientific understanding of atmospheric chemistry and related air motions. It initially focused on the chemistry and motions of the upper atmosphere's ionosphere, in response to the Nation's need for scientific information that would enable advances in radio communications and matters of national security. In the 1970s, the Aeronomy Laboratory's research shifted to the chemistry of the lower layers of the atmosphere as the national environmental issues of stratospheric ozone depletion and acidic deposition emerged. Over the recent decade, AL's research foci have included the chemical processes that control the characteristics of greenhouse gases and aerosols in the lower atmosphere and that control surface-level ozone pollution episodes.

CLIMATE DIAGNOSTICS CENTER

Mission

The mission of the Climate Diagnostics Center (CDC) is to develop national capabilities to analyze, interpret, and forecast important climate variations on time scales ranging from a few weeks to centuries. To achieve its mission, CDC develops and applies a wide range of research methods, particularly emphasizing state-of-the-art diagnostic techniques, to elucidate fundamental processes governing climate phenomena such as droughts, floods, and the El Niño/Southern Oscillation, and to identify the causes of longer-term (decadal to centennial) climate variations. CDC also performs extensive intercomparisons of observational and climate model data, an activity vital to improving current research and prediction models.

The development of improved climate assessments and predictions enhances the Nation's economic and environmental security, and is a fundamental part of NOAA's mission. Diagnostic studies, for which CDC has exceptional breadth and expertise, vitally contribute to this process by linking basic observational and theoretical research to improvements in operational climate predictions and, ultimately, to the development of new climate products that better serve the needs of the public and decision-makers

Brief History

CDC was formed in 1993 through a Memorandum of Agreement (MOA) between the Office of Oceanic and Atmospheric Research (OAR) and the Office of Global Programs (OGP), with personnel derived from what had formerly been the Climate Research Division of the Climate Monitoring and Diagnostics Laboratory. The purpose of the OAR-OGP agreement was to establish a unique, focused center of expertise within NOAA to develop and apply diagnostic methods that would aid in understanding the dominant processes influencing climate variability and link observational analyses to model testing and evaluation. Under the terms of the MOA, CDC is managed as one of the Research Laboratories in OAR.

Organization
CDC is staffed by NOAA personnel and affiliated scientists from the University of Colorado Cooperative Institute for Research in Environmental Sciences (CIRES), with approximately forty CIRES staff and fourteen federal staff directly affiliated with CDC. In order to more explicitly recognize this large and focused set of joint activities, a University Center within CIRES, also named the Climate Diagnostics Center, was formed in 1997. This organization integrates and coordinates climate research in NOAA/OAR and CIRES with other existing University research and instructional programs, thereby enhancing prospects for mutually beneficial collaborations among NOAA and university scientists over a broad range of disciplines.

CLIMATE MONITORING AND DIAGNOSTICS LABORATORY

Mission and Purpose
The Climate Monitoring and Diagnostics Laboratory (CMDL) is the only federal laboratory whose mission is to monitor atmospheric greenhouse species that affect climate and those that cause ozone layer depletion. Long-term, continuous, precise measurements of climate forcing and ozone layer depleting species are required for climate and ozone layer projections which are delivered to customers through international assessments such as the IPCC Climate Assessments and the UNEP/WMO Ozone Assessments. These assessments provide policy-relevant information on future climate and status of the ozone layer. Linkage to the NOAA Strategic Plan is through Mission Goal 2: *Understand climate variability and change to enhance society's ability to plan and respond.* In the case of ozone and ozone-depleting gases, NOAA, along with NASA, is mandated to report to Congress on their status by the Clean Air Act of 1990. CMDL's research is linked closely to the U.S. Climate Change Science Program which has as its Mission Goal 2: *Improve the quantification of the forces bringing about changes in the Earth's climate and related systems*, which has been adopted for the NOAA Climate Program Mission Goal 2. CMDL accomplishes its mission through five baseline observatories and a global cooperative flask sampling network including more than 50 sites with analysis done in Boulder using CMDL-produced gas standards. Climate forcing species monitored include carbon dioxide and methane and their isotopic carbon content, nitrous oxide, the CFCs, stratospheric and tropospheric ozone, aerosols, solar radiation, and for stratospheric ozone depletion, all the chlorine- and bromine-bearing species that deplete ozone. In addition to policy-relevant information made available in assessments, CMDL uses its data (about 85% of the world's carbon dioxide data) together with data from other countries to form global greenhouse gas data bases (GlobalviewCO2 and GlobalviewCH4) available on the web and experiences 80-100 file download requests per month from government agencies, universities and private citizens in numerous countries. Recently an interactive data visualization program has been added to CMDL's web site which allows non-specialists and students to graph any of CMDL's data.

Brief History
CMDL was formed in 1990 from climate-related elements within the Boulder branch of the Environmental Research Laboratories' Air Resources Laboratory, in particular, the Geophysical

Monitoring for Climatic Change (GMCC) program and the Climate Research Division (CRD). The latter became the Climate Diagnostics Center (CDC) in 1993. Four of the Baseline Observatories (Barrow, Alaska; Mauna Loa, Hawaii; American Samoa; and South Pole Station, Antarctica), are staffed sites established shortly after NOAA's creation in the early 1970s. A fifth observatory, currently unstaffed, was established at Trinidad Head, California in 2002 to monitor Asian emissions incidents on the west coast of the U.S. The Mauna Loa Observatory carbon dioxide record constitutes the longest continuous carbon dioxide record in the world (more than 40 years) and is considered by many to be the most important long-term environmental record in existence, being the origin for concern about potential long-term climate change.

ENVIRONMENTAL TECHNOLOGY LABORATORY

Mission

The Environmental Technology Laboratory (ETL) supports the strategic goals of NOAA and OAR through regionally specific research efforts in weather, climate, and air quality using the Laboratory's unique expertise in remote sensing of the geophysical environment.

Brief History

The Wave Propagation Laboratory (now ETL), like a number of the original Boulder Laboratories, grew out of the research of the Central Radio Propagation Laboratory in the late 1960s. The laboratory, formed in 1967 under the leadership of Dr. C. Gordon Little, focused on developing remote sensing methods (optical, radio, and acoustical) as a new means to study the geophysical environment. In the 1970s and early 1980s, ETL began focusing on a number of practical problems including applying its acoustical and optical remote sensing methods to the study of regional air quality. The transfer of the boundary layer research group from the Air Force Cambridge Labs to ETL in the mid-1970s accelerated these efforts. In addition, ETL began developing and demonstrating the value of operational networks of radar wind profilers for weather forecasting. In the course of these activities, the Prototype Regional Observing and Forecasting System (PROFS) and the Wind Profiler Demonstration Network were spun off from the laboratory and later formed the nucleus for the Forecast Systems Laboratory in 1988. Most recently, in response to a number of external reviews, the laboratory has narrowed its focus to developing and refining remote sensing technology for regional weather and climate applications while maintaining its unique blend of physicists, engineers, and meteorologists necessary to promote science and technology transfer. Currently, two of ETL's four Divisions focus on technological innovations in the areas of optical and microwave propagation, including airborne remote sensing, while the other two focus on 1) applications to surface, cloud, and radiative processes, and 2) applications to problems in regional weather and climate.

FORECAST SYSTEMS LABORATORY

Mission

The mission of the Forecast Systems Laboratory (FSL) is to transfer scientific and technological developments in atmospheric and oceanic research to the Nation's operational services. It conducts programs to integrate, and apply developments to, observing, information and forecast systems. These programs are important in helping NOAA meet its objectives to improve its ability to observe, understand, and model the environment and effectively disseminate its products and services to various users. The following are FSL's essential functions:

- ***Exploratory system development.*** Developing and validating information systems to satisfy NOAA's operational services.
- ***Research applications.*** Using advances in understanding atmospheric and oceanic processes to develop improved data management systems, forecasting systems, and analysis systems for geophysical data.
- ***System validation.*** Testing systems in realistic environments to assess their usefulness in improvement of NOAA's services.
- ***Technology transfer.*** Facilitating transfer of new techniques and systems to operational status, working directly with users.

Brief History

FSL was formed in 1988. It developed from three Environmental Research program areas: the Program for Regional Observing and Forecasting Services (PROFS), the Profiler Technology Transfer Group (PTTG), and the Weather Research Program (WRP). These programs along with several other major activities make up the nucleus of FSL today.

SPACE ENVIRONMENT CENTER

NOAA has proposed to transfer the Space Environment Center to the National Weather Service in the FY 2005 President's Budget.

Mission

The Space Environment Center provides real-time monitoring and forecasting of solar and geophysical events, conducts research in solar-terrestrial physics, and develops techniques for forecasting solar and geophysical disturbances. SEC's Space Weather Operations Center is jointly operated by NOAA and the U.S. Air Force and is the national and world warning center for disturbances that can affect people and equipment working in the space environment. The Center is both a laboratory in NOAA Research and one of the centers in the National Weather Service's National Centers for Environmental Prediction.

Brief History

SEC's predecessor, the Space Environment Laboratory, was formed in 1962, and began disseminating daily forecasts of space environment conditions in 1965 before NOAA existed. The service came into being during World War II when variations in the space environment adversely affected communications radar and radio navigation. The importance of these services has increased with the flourishing and expanding use of electronic devices, vulnerable to space weather, the use of satellites for communication and radio navigation, the deregulation of the electric power grid, and increased passenger flights at high; attitudes and altitudes.

In 1995 NOAA and the other government agencies interested in space weather initiated the National Space Weather Program (NSWP) to coordinate the nation's R&D, transitions to operations, and services efforts in space weather. The NSWP participants are the Departments of Commerce, Defense, Energy, Interior and Transportation, with NSF and NASA, and is administered through the Federal Committee for Meteorological Services and Supporting research (FCMSSR and the Office of the Federal Coordinator for Meteorology. SEC is a member for the International Space Environment Services (ISES), which traces it's parentage to the International Council of Scientific Unions (ICSU).

SEC, like what the National Weather Service has done for meteorology, has developed devised and implemented models to guide forecasters, pursued data assimilation, and partnered with the United States Air Force for data and models, and relied upon a services industry to tailor products for individual users. SEC has also performed world-class research to better understand the space environment.

Appendix IX
Air Resources Laboratory (ARL)

History: The Air Resources Laboratory emerged as the Weather Bureau's Special Projects Office in the early 1950s. It was formed to provide meteorological (especially dispersion) guidance to national security programs, mainly nuclear. The evidence of its beginnings is still noticeable. To this day, ARL serves as the source of atmospheric transport and dispersion capabilities to the National Weather Service, to NOAA as a whole, and to a wide range of external users (both national and international). Whereas the early focus was simply on the prediction of concentrations downwind of some specific emission source (e.g. a nuclear test), the dispersion skills have now broadened into many related areas of specialty. Out of the early awareness that radioactive fallout was a global issue grew the current activities related to climate and global change. From the need to consider the chemistry of pollutants arose the present emphasis on air quality and its prediction. From the recognition that mankind could modify the atmosphere on global scales came the ARL emphasis on climate and methods to detect changes in it. And from the awareness that pollutants are removed from the air through deposition processes came the ARL role in measuring and understanding wet and dry deposition and the growing activity in multi-media modeling of the whole environment. All of these activities are directly related to NOAA's core mission - the protection of people, the stewardship of the environment, and the prediction of changes in it.

Mission Statement: The Air Resources Laboratory (ARL) studies the atmosphere as a component of the total environment, primarily in the context of air pollution, deposition, emergency preparedness, and climate change; much of this work is conducted in collaboration with other agencies such as the Department of Energy (DOE), the Department of Defense (DOD), and the Environmental Protection Agency (EPA). ARL conducts research on processes that relate to air quality and climate, concentrating on the transport, dispersion, transformation, and removal of trace gases and aerosols, their climatic and ecological influences, and exchange between the atmosphere and biological and non-biological surfaces. The time frame of interest ranges from minutes and hours to that of the global climate. Research in all of these areas involves physical and numerical studies, leading to the development of air quality simulation models. ARL provides products to NOAA and other Government agencies in the form of scientific and technical advice, research publications, and prototype tools for operational application.

Organization: ARL operates with six research groups, each with its own research agenda but also each with a specific function within the ARL structure. The Atmospheric Turbulence and Diffusion (ATDD) at Oak Ridge, Tennessee, develops models to describe the processes of diffusion and deposition of pollutants. The Atmospheric Sciences Modeling Division (ASMD) in Research Triangle Park, North Carolina, assembles the process understanding into coupled meteorology and air chemistry models, for application in air quality programs of the Environmental Protection Agency and other organizations (e.g. states). A further role of the

Research Triangle Park group is to extend its air quality modeling to the provision of real-time forecasts, and activity that calls for close collaboration with elements of the National Weather Service. The Field Research Division (FRD) at Idaho Falls, Idaho, specializes in conducting field studies to test the validity of dispersion models. At Silver Spring, Maryland, Headquarters work concentrates on the development of dispersion models tailored for operational use, such as by the National Weather Service. At the Special Operations and Research Division (SORD) in Las Vegas, Nevada, the dispersion capabilities are applied routinely in support of the nuclear missions of the Department of Energy. In recognition of the fact that new models require increasingly more information on the surface energy budget, the Surface Radiation Branch (SRRB) in Boulder, Colorado, operates research-grade measurement stations where the surface radiation balance is documented. In whole, the set of ARL field offices constitutes an end-to-end model development, testing, and implementation capability. The success of the process is well illustrated by the fact that many models developed by ARL scientists are now fully operational, in DOE and the EPA as well as in the service Line Offices of NOAA.

FY 2003 Funding and Staff

Division	Base 1/	Cong'l Add-ons	Other NOAA 2/	Other Agency 3/	TOTAL
Hdqtrs (MD)	$3,420,600	4,071,200	1,190,100	429,800	9,111,700
ASMD (NC)	220,000		1,022,000	6,247,500	7,489,500
ATDD (TN)	1,008,600	623,800	864,100	1,272,900	3,769,400
FRD (ID)	269,800		240,000	1,756,700	2,266,500
SORD (NV)	25,000		0	2,000,700	2,025,700
SRRB (CO)	545,000		295,000	501,700	1,341,700
Total	$5,489,000	4,695,000	3,611,200	12,209,300	26,004,500

Legend:

1/ Base - Permanent appropriated funding received every year.

2/ Other NOAA - Funding from NOAA programs; awarded on a competitive basis (not guaranteed every year).

3/ Other Agency - Includes both long-term agreements w/EPA & DOE (50+ years) as well as competitive funds awarded annually.

Detail on Reimbursable Funding by ARL Divisions in FY 2003

Division	EPA	DOD	DOE	USDA	NASA	Other	TOTAL
Hdqtrs (MD)	42,700	100,100		115,000		172,000	429,800
ASMD (NC)	6,228,000					19,500	6,247,500
ATDD (TN)		126,900	580,000	51,300	202,700	312,000	1,272,900
FRD (ID)		1,056,200	700,500				1,756,700
SORD (NV)	273,000		1,722,200			5,500	2,000,700
SRRB (CO)	98,300		50,000	260,600	87,700	5,100	501,700
Total	$6,642,000	1,283,200	3,052,700	426,900	290,400	514,100	12,209,300

Detail on research areas and staffing by division:

1. **Headquarters - Silver Spring, MD**
   Staffing -- 25 total staff - 18 Federal Employees
   Three principal areas: development of improved dispersion models (HYSPLIT Model); detection and quantification of climate variability and climate change; and air surface exchange, with emphasis on wet deposition.

2. **Atmospheric Turbulence and Diffusion (ATDD) - Oak Ridge, TN**
   Staffing -- 38 total staff - 12 Federal Employees
   Three principal areas: The Climate Reference Network; Air-Surface Exchange (with emphasis on dry deposition and carbon dioxide); and) Air Quality and Dispersion Research.

3. **Field Research Division (FRD) - Idaho Falls, ID**
   Staffing -- 21 total staff - 11 Federal Employees
   Principal activities: dispersion field studies;) development of high technology instrumentation; and research on mesoscale meteorology and dispersion in support of the Idaho National Engineering and Environment Laboratory.

4. **Special Operations and Research (SORD) - Las Vegas, NV**
   Staffing -- 21 total staff -- 16 Federal Employees
   This division was originally formed to provide meteorological (primarily dispersion) expertise in support of national security programs headquartered in Nevada and developed jointly with DOE and EPA weapons and chemical testing programs. Following redefinition of the group's role in 1997 and the generation of the NOAA Cooperative Institute for Atmospheric Sciences and Terrestrial Applications (CIASTA) to work with them the principal areas of research are mesoscale dispersion research, atmospheric aerosols, and lightning.

5. **Surface Radiation Branch (SRRB) - Boulder, CO**
   Staffing -- 13 total staff -- 3 Federal Employees
   This group is a component of the Headquarters Division of ARL. It concentrates on the factors that drive weather and climate –the surface radiation balance, aerosol/radiation interactions, and UV and IR radiation. This group operates the national Central UV Calibration Facility, as a joint activity with NIST.

   SRRB operates the SURFRAD program, which is the mainstay of the ARL integrated monitoring program that brings together all aspects of measurements related to air-surface exchange conducted across four ARL Divisions. Specific SRRB contributions address surface energy balance measurements as necessary to address numerical weather forecasting and climate change.

6. **Atmospheric Sciences Modeling Division (ASMD) - Research Triangle Park, NC**
   Staffing -- 46 federal staff, 53 total staff
   Three principal activities: development and quality assurance of air quality and atmospheric deposition models to underpin EPA's policy and regulatory activities; development of air quality models for joint (NOAA and EPA) provision of air quality forecasts;) air-surface exchange; and iv) the air quality/climate interface.

Major Types of Activities across multiple locations

- Long-term development of air quality forecasting and assessment models (process research at Oak Ridge; model development at Oak Ridge, Research Triangle Park and Silver Spring).
- Development of dispersion models (process research at Oak Ridge and Idaho Falls; model development at Oak Ridge, Research Triangle Park, Idaho Falls, Las Vegas and Silver Spring; and field testing at Las Vegas and Idaho Falls).
- Operation of long-term monitoring networks (deposition networks at Oak Ridge and Silver Spring, and surface radiation networks at Boulder).
- Studies of air-surface exchange (experimental work at all ARL locations; model development at Oak Ridge, Boulder and Research Triangle Park).
- Atmospheric mercury and its deposition (involving Research Triangle Park, Silver Spring, and Oak Ridge).
- Integrated monitoring (the ACORN program, with surface radiation studies at Boulder, total heat budget work at Oak Ridge, CO2 exchange at Oak Ridge, wet deposition at Silver Spring, and dry deposition at Oak Ridge).
- Support of national security programs (all Divisions).
- Atmospheric aerosols (exchange studies at Oak Ridge, Research Triangle Park, Silver Spring and Las Vegas; modeling developments at Research Triangle Park and Oak Ridge).
- Air quality and climate variability (Silver Spring, Research Triangle Park, and Boulder).
- Urban meteorology (all ARL groups).

Appendix X

Article: The Customer for R&D Is Always Wrong," by Robert Frosch,
from the Nov.-Dec. 1996 issue of Research-Technology Management, pp. 22-27.

Frosch, Robert A. 1996. "The Customer for R&D Is Always Wrong!" *Research*Technology Management* 39 (November/December).

THE IRI MEDALIST'S ADDRESS

The Customer for R&D Is Always Wrong!

Effective R&D management depends upon interconnected knowledge and the interconnection of people who possess that knowledge. Current fads in corporate restructuring ignore that.

Robert A. Frosch

OVERVIEW: *The current fad of corporate managements, taking short-term views and distributing R&D assets to operating divisions, is like a farm investor who is interested only in harvesting and will not invest in planting, cultivating or irrigating; neither is likely to get much good harvest for very long. Applications R&D depends on using the interconnectedness of many kinds of knowledge, and thus depends on the close interaction of research people with that knowledge. The destruction of these key connections, together with the fact that the customer for R&D is always wrong about the requirements, will ensure future trouble.*

An admiral with whom I worked in the U.S. Navy Secretariat used to come into the office occasionally to talk about the technological issues for which we both had responsibility. Once a year he would say, "Well, boys, let me tell you about the spring styles in warships. This year, destroyers will be wearing . . ."—and he would go on like that for a while.

Having been in the R&D business for some time, I keep my eye on the spring styles in R&D and try to decide whether I think they are hot stuff or not. The current fad seems to be: "Let's break up all that central R&D, which does something or other but we don't know what, and put it out in the divisions. If we can't pull it all out, then let the divisions buy what they need instead of letting those people in the ivory tower do all that stuff we don't understand. We must have relevance now, with everything results-oriented, and small improvements the big thing."

I listen to all this (I've heard it before) and it reminds me of someone investing in a farm who insists upon saying, "Don't ask me to buy any seed, please don't bother me with investing in planting, I don't want to be around when you're cultivating, and I don't care about irrigation. But when you get to the harvest, call me, and I'll be there to help you out."

We know what happens to that farmer. That farmer—or that investor—ends up with no crop and no harvest. I have a feeling that in a few years we shall discover that the farm that was going to be planted, seeded, irrigated, and produce a good harvest, will for some reason be producing no fruit or stunted fruit.

Knowledge: Cumulative and Connected

Newton said, "If I have seen further then other men, it is because I have stood upon the shoulders of giants." He didn't invent the phrase; it was much older (*1*) What he meant, of course, was that knowledge is a cumulative, slowly developing thing; others before us have been tall and seen much, and therefore we can see even farther. If you want to do new things, then you had better know about the old things, and you had better know a broad collection of what is known: what the giants discovered. We stand upon the shoulders of Newton and Gibbs, Bohr and Einstein, Brunel and Steinmetz, the Wright brothers and Watt, and others more recent.

Francis Bacon, even earlier, wrote, "Nature, to be commanded, must be obeyed" (*2*). This was a profound statement—if you want to develop a technology, if you want to use knowledge, you had better understand how the universe works or you may be trying to create something that cannot be done. Any R&D fad that tries to destroy the connectedness and the deep roots of knowledge that lead to technological capability is going to put the business in trouble.

It is the structure of knowledge and the structure of the background of technological creations that forces some of the organizational aspects of R&D. We ignore this at our peril. Think, for a moment, of the kinds of knowledge that we use and take for granted, and the connections of knowledge that are necessary to solve any real industrial or commercial problem. I can think of it most easily, because of being most recently involved, in terms of automotive problems—but each reader will be able to translate what I am going to say into their own experience.

A common desire in the automotive industry is to build a more efficient engine. This is frequently seen as an automotive engineering task of a classical kind. However, if you think about what is inside trying to do that, you will discover that you are dealing with a piece of combustion chemistry, and chemical kinetics and thermodynamics, all of which is developing inside a

Robert Frosch is the Industrial Research Institute Medalist for 1996. His article is adapted from the address he delivered upon accepting the Medal at the IRI Annual Meeting in Colorado Springs, Colorado, May 1996.

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fluid-dynamic flow system, with heat transfer working with the chemistry. That is all embedded in a firing chamber which has a shape, and a structure, and is made of materials, and which has to be designed in those terms. You find yourself dealing with computational fluid dynamics and computational structure. You may be up against a set of equations in chemical and combustion kinetics that you may or may not have seen before, and new problems in mechanical and structural design, and in friction as well.

So the problem is not a simple old problem, it is a problem in the connectedness of knowledge: past knowledge and practice, recent knowledge, new knowledge, and as yet unknown knowledge. If you are trying to do something new, then you had better have access to people who can solve the equations, help you with the computations, tell you some things you didn't know about structural dynamics, solve the material problems that you thought you had solved when you picked the new material, but you didn't quite, and so on.

If you take any such problem, you get a similar set of interconnectedness and deep roots in past history. You find that you are living on the shoulders of the giants of the past, but also upon the current inventions of colleagues you may not have thought about: physicists, chemists, other engineers, and so on. If you do a problem in structural mechanics to build a body design, or a problem in the molding of polymers to create a part, you will be able to trace a similar set of roots.

The problem of R&D management is, in a sense, the problem of the management of a variety of forms of knowledge that are deeply interconnected, and whose interconnectedness one learns as one tries to solve the problem. It turns out to be a problem of maximizing collision cross sections among kinds of knowledge: making sure people who need knowledge they don't have—and may not even know they need—have a good chance of learning about it.

This is what led naturally to the industrial research laboratory: no single investigator is likely to be able to capture all of the richness of the knowledge connections, both into the past and with present colleagues. To destroy that connectedness by distributing the pieces conveniently among a set of divisions, with the idea that then everybody will be closer to the problem, is to destroy the root capability to solve the problem, and even the root capability to understand what the problem is.

The Customer Is Always Wrong

After 40-odd years of working in application-and mission-oriented research, I have come to believe profoundly that the customer for technology is always wrong. Now, the technologists are usually wrong, too; they tend to be wrong in complementary ways. I have seldom, if ever, met a customer for an application who correctly stated the problem that was to be solved. The normal statement of the problem is either too shallow and short-term, or, even more likely, is a formula for the widget that the customer thinks is required to solve what the customer thinks is the problem. The technologist, of course, is usually peddling "that wonderful thing we did in the laboratory yesterday," and if it happens to be square and the hole is round, a little force-fitting may help.

I have seldom, if ever, met a customer for an application who correctly stated the problem that was to be solved.

What really happens in successful problem-solving endeavor, the successful definition of a product or of a new process, is the redefinition of the problem, along with the redefinition and creation of the solution. A dialogue process has to go on in order to achieve this redefinition. It is in that dialogue process that the rich collection of knowledge gets employed on the technological side and a good deal of implicit knowledge on the customer side. There is a certain logic to saying that the R&D ought to be close to the divisions and to the customers for technology, and, indeed, it should be.

That works neatly if the problem is more-or-less a current problem to be solved, so that the time scale is such that it is, in fact, a divisional time scale and within the division's imagination. However, a good deal of what is required in industrial R&D is not on the time scale of the division. Divisions do not normally think long technological thoughts about the future. A GM platform engineer with whom I was having lunch said, "Do you people work for me?" My answer was, "Yes, but, as a matter of fact, the R&D people who are working for you now are the people who were in the research labs 15 years ago."

Working for the Division's Grandchild

Much of what research people do, and should do, is working for the divisional person's professional grandchild; that is to say, the person who will be in the job after the person who takes it from the current occupant leaves it. If there is to be a technology that that person will need, R&D people have to think about it *now*.

Of course, the person who is building today's product may or may not be any good at talking about the product after next. There is a natural misfit between the time of longer-range R&D and the time for current products. In that sense, the dialogue is very difficult. Nonetheless, somehow the R&D function must be informed of the processes of the divisions and the processes of the corporation thoroughly enough to exercise the knowledge

and imagination to determine what should be done for the future.

So, close dialogue and connection are important. The R&D people must somehow swim in an ocean of corporate problems, present and future. The necessary dialogue and connection, of course, take place through that other important function of R&D, besides creating the future: the function of solving current problems and helping with the business day to day. To suck up the entire R&D into the day-to-day business is to destroy the possibility of a future new business; that is, it is to say, "Call me at harvest time and don't bother me with planting, cultivating and irrigating."

A Heisenberg Uncertainty Principle

We have an inherent dilemma of time scales that don't fit, of knowledge, breadth that has to be captured in one place, and at the same time a connection to be made between the day-to-day operation of the business, with R&D people solving its problems, and together creating the future at the same time.

There is a kind of Heisenberg uncertainty principle about the coordination connections that are necessary in R&D. One needs all of these deep connections among kinds of knowledge, and the ability to think about the future, that works best in an institution that puts all those people together. One also needs connection with the day-to-day, market thinking, and the future thinking of the operating side of the business, which suggests to many that the R&D people should be sitting on the operating side of the business.

The R&D people must somehow swim in an ocean of corporate problems, present and future.

This is an insoluble problem; there is no organizational system that will capture perfectly both sets of coordination. Organizational matrices do not have eigenvalues; they are not diagonalizable. There is no perfect organization that will solve this problem—the struggle is inevitable.

Consider organization in the Department of Defense. There are two simple ways to organize the Pentagon: functionally by kinds of warfare or knowledge, or by weapon systems projects. There is always an uneasy compromise between the two. As the Pentagon was reorganized, it turned out that what was being done was flipping the matrix from one way to another, and back and forth, with the rows relabeled columns and the columns rows. Everyone was somehow under the impression that the way that they weren't organized must be the right one because they were dissatisfied with the current one.

The uncertainty principle forces a kind of oscillatory behavior, where, as I have seen it, the full wave is somewhere between 10 and 20 years between organizing one way and deciding that the gospel is the other way. What happened during the last wave, when many places

R&D Management 101

1. In order to harvest, you must first seed, plant, cultivate, irrigate, and wait. This is as true of R&D as it is of farms. R&D's mission is to imagine and create the seeds of the future.

2. Remember what Sir Isaac Newton and Francis Bacon said: "If I have seen further than other men, it is because I stood on the shoulders of giants," and, "Nature to be commanded, must be obeyed."

3. Matrix your industrial problems to be solved vs. the kinds of knowledge that are needed to solve them (e.g., more efficient internal combustion engines require chemical kinetics, heat transfer, fluid dynamics, mathematics, computational compatibility, and more).

4. Great R&D must preserve the connections between various kinds of knowledge; i.e., keep the R&D people together.

5. R&D also needs connections with the operating side and its needs for problem solving, especially for future problems. R&D should work for the operating divisions of the future even more than for the operating divisions of today. The operating/R&D dialogue is an imperative.

6. Connections among knowledge forms and people, and between R&D and the divisions, will inevitably be imperfect. Keep searching for better ways to connect, including, for example, "synthetic alumni" of the R&D lab.

7. If it is considered such a great idea for the divisions to buy all of their R&D—and jeopardize future R&D possibilities in the process—then ponder the implications of having them choose how much financial accounting, auditing and central management they wish to buy.

8. Measure R&D by:

- Past performance, not promises/predictions.
- Summing the value of the successes and comparing with the total cost of the research lab, not individual projects.
- Projecting the value of successes over their product or process life—the internal rate of return can be surprisingly high.

9. Institutions are needed to synthesize knowledge-connecting R&D for small and meso-scale business networks (e.g., machine shop, small foundries).

10. Keep fighting the good fight for the future of the business—and society at large. —R.A.F.

destroyed central R&D, was that they put all the R&D out in the divisions, and for as long as three or four years the business was deliriously happy because the divisions were getting what they needed. They then suddenly discovered there wasn't anything new, they had eaten that all up, and the people who were to be creating the new were now so busy solving the old that they had no time for the future. The more unusual and difficult-to-understand forms of knowledge, difficult for the divisions to see the need for on a day-to-day basis, had vanished.

Now a problem would turn up and somebody would say, "Where is that person who was the great expert on, whatever that was?"

"Oh, that person isn't here any more because we didn't have any use for that knowledge last year. Now we need it badly but they've gone away."

Putting it in the diffused-into-the-divisions system makes no sense to me. I would rather struggle with the problems of connecting with the divisions—and there are techniques for that—and by holding the R&D laboratory together, be able to solve what I think is the more long-term and difficult problem of the connectedness of knowledge.

It is reasonable to have the divisions, the operating side, buy short-term help from R&D and solve day-to-day problems in that demand-driven way. The idea that R&D should be totally and entirely supported by divisional purchases, however, is merely a slightly longer-term version of the destruction of R&D for the future than actually breaking it up and putting it in the divisions.

I suggest that the next time the business side of the house explains to you that that is the proper way for the firm's internal market to work, you suggest that if it is such a lovely principle, there is a modest proposal to run the whole place that way: Let's have the divisions buy their accounting and their auditing from the financial people; let's have them buy the CEO's time, let's buy personnel services from Personnel (pardon, "Human Resources") by the inch when they need it. Let's see whether, in fact, that internal market system is a reasonable way of running a business. Everybody knows it is not, but it is sometimes convenient to apply the idea to the pieces we don't understand.

GM's Synthetic Alumni

Earlier, I mentioned schemes for connecting R&D with the operating side, and I am sure everybody has their own versions of these. One, which was invented at GM by Larry Howell and others, and actually reduced to practice while I was there, was the construction of what we called "synthetic alumni" of the research laboratories. The underlying observation was that a good deal of the best connectedness with the operating divisions came from people who had been in the research labs and were now on the operating side.

A way was created of bringing people into research who really wanted operating careers, not R&D careers. After a year or two in the Research Labs, they moved to a division, with special knowledge of some new technology that was of interest to that division. In this way, we created connections that brought the new divisional problems back to Research and kept it clearly up-to-date on what was happening on the operating side.

From their research experience, these alumni had usually developed an "ear" for what might be a question or problem to bring to the attention of the Research people. Naturally, Research Lab people visited the divisions a lot, and there was frequent contact, at the level of "bench" people, as well as managers, between Research and many divisions; there was much visiting back and forth. Certain Research Lab departments worked intensively with particular divisions for many years.

Helping Smaller Businesses

So far, I have spoken in terms that make sense for large companies that can afford to have the research and development capabilities of many kinds of knowledge, can afford to have, for example, a good stable of mathematicians. (By the way, how many divisions do you know that need a mathematician all the time, and how many divisions do you know that never need a mathematician? The answer is usually none in both cases, but you had better have them somewhere.)

What does a smaller business that cannot keep a stable of these different experts do for the knowledge connections? I have become acquainted with this problem recently through research I have been doing on the way metal flows through, and is handled in, the metals manufacturing business in New England: foundries, machine shops, stamping shops, jewelry manufacturers, and so on. These tend to be businesses that don't do much R&D because they cannot afford much R&D. And so they are not, in fact, on the cutting edge of the technology that they could be using. Sometimes they can buy it from suppliers, but they are more likely to be victims than real customers for R&D.

It is clear that some means of cooperation in the generation of R&D capabilities that a number of companies in the same business could use is a missing piece in some industries. It may also, in terms of the breadth of knowledge, be a missing piece for many not-very-large companies.

I had thought naively that trade associations and professional organizations could be a means to doing R&D in these situations, or a means of getting it done in a cooperative way. However, I discovered that most of the trade associations I talked to were so worried about liability issues if they became recommending organizations for R&D results and technology, and also worried about appropriability of intellectual property and

antitrust, that they had not found a way to play a really useful role. I suggest that there is a missing piece of our R&D business institutions (it occurs in some places, like the utility industry, but not in others) which is a way for small- and medium-sized businesses to cooperate in the creation of knowledge systems that they can use as though they were large businesses.

There are university-connected situations where people have done this over a period of years in a reasonable way. None of them that I know of has grown into a real equivalent to a major industrial R&D capability. I think there is a missing opportunity for what I might call the meso-scale and the small scale of U.S. business, something perhaps worth thinking about.

Measuring the Payoff

I have no illusion that the interconnectedness of knowledge will be a convincing sales pitch to most of the business side of most corporations. However, I have had some success in convincing the business side that one needs a breadth of knowledge by illustrating the matrix of problems versus kinds of knowledge needed to solve them and showing that, in fact, the way in which many new ideas arise and problems are solved is by collisions among old kinds of knowledge, and different kinds of knowledge, which create new views and knowledge.

Part of the issue in making that sale is understanding what the payoff of the R&D system really is. There are a couple of rules about measuring it, and only a few successful attempts have been made.

Rule one is that you cannot measure the future; the only thing you can measure is past performance. You have to measure R&D by what you have done.

Incidentally, the business side of the house doesn't measure the future either, although it frequently pretends to. In fact, most businesses refuse even to measure their predictions of particular projects against the statistical history of the success of past projects.

After watching a number of new product presentations at GM, I suggested that an additional slide be in view at all times that displayed the fiscal history of the past projects, just to see whether the predictions of the new ones were consistent with the statistics of the past. It was clear that nobody was interested in looking at such a slide, of past data together with the predictions.

The second rule is that it is useless to measure payoff project by project. The only measurement successes I have seen—and I've seen a couple of them in measuring R&D—are to measure the sum of the value of the successful projects against the total cost of all the R&D. We made some measurements of that sort at GM when I was there. It is very labor-intensive because you have to trace a lot of projects and determine their value to the company. You use the total cost of the research lab as the denominator.

The only measurement successes I have seen are to measure the sum of the value of the successful projects against the total cost of all the R&D.

We took a sampling of successful projects, went to the divisions and found out what they thought the projects were worth over a standard corporate project life. This was a lower bound because frequently it was difficult to find out the real history of a project, so some successes were left out. However, we collected enough that had been successful to give us some numbers for the numerator. We did this on a one-year slice as well as we could, and divided it by the total cost of having the research lab for a year—all lab costs. We projected the value of these for their project life (usually the standard corporate project accounting period), and did an ordinary internal rate of return computation.

We did this twice, several years apart, using the second time partly as a check computation on the first, to see whether the projects had lasted, but also to do a semi-independent examination. Our internal rate of return was about 70 percent. That is a very large internal rate of return! What this result really meant was that we did a lot of projects and although many of them never came to anything, a few were big successes and did a lot more than pay the rent.

GE has done a study of that sort and it produced an IRR of about 38 percent for a corporation rather different from GM in structure and product line (*3*). Both numbers are large enough that the difference between them doesn't matter, and they are enough larger than the IRR of anything else in most corporations that they ought to be interesting. These large values come because the R&D process creates useful change.

To sum up, in spite of the demonstrable value of R&D, the current fads in corporate restructuring turn out to be a replay of some old ones that were bad for industrial research. We are finding out once again how to make it difficult to do R&D, and we will probably discover in a few years that we have succeeded in that endeavor, and go back to reconstructing the system on the basics that work, the basics of interconnected knowledge and the interconnection of people who have that knowledge. ⊙

References

1. Robert K. Merton. *On the Shoulders of Giants*, Chicago, University of Chicago Press, 1993.
2. *Novum Organum*, 1620.
3. Walter Robb, private communication.

Appendix XI
Acronyms List

AA ..... Assistant Administrator
AER ..... Atmospheric and Environmental Research, Inc.
AGU ..... American Geophysical Union
AIDS ..... Acquired Immune Deficiency Syndrome
AIS ..... Aquatic Invasive Species
AL ..... Aeronomy Laboratory
AMS ..... American Meteorological Society
AO ..... Announcement of Opportunity
AOML ..... Atlantic Oceanographic and Meteorological Laboratory
ARL ..... Air Resources Laboratory
ASCAC ..... Advanced Scientific Computing Advisory Committee
AWIPS ..... Advanced Weather Interactive Processing System
BCI ..... Basic Commerce and Industries
BERAC ..... Biological and Environmental Research Advisory Committee
BVOC ..... Biogenic Volatile Organic Compound
CASA ..... Collaborative Adaptive Sensing of the Atmosphere
CCSP ..... Climate Change Science Program
CDC ..... Climate Diagnostics Center
CICOR ..... Cooperative Institute of Climate and Ocean Research
CIMMS ..... Cooperative Institute for Mesoscale Meteorological Studies
CIRA ..... Cooperative Institute for Research in the Atmosphere
CIRES ..... Cooperative Institute for Research in Environmental Sciences
CJS ..... Commerce, Justice, State (Appropriations Subcommittees in Congress)
CORE ..... Consortium for Oceanographic Research and Education
CRD ..... Climate Research Division
DDT ..... Dichlorodiphenyltrichloroethane
DOC ..... Department of Commerce

DOD ..... Department of Defense
ENSO ..... El Niño/ Southern Oscillation
EPA ..... Environmental Protection Agency
ETL ..... Environmental Technology Laboratory
FTP ..... File Transfer Protocol
GEOSS ..... Global Earth Observing System of Systems
GFDL ..... Geophysical Fluid Dynamics Laboratory
GLOBEC ..... Global Ocean Ecosystem Dynamics
GMCC ..... Geophysical Monitoring for Climate Change
HRD ..... Hurricane Research Division
IGBP ..... International Geosphere-Biosphere Programme
IOOS ..... Integrated Ocean Observing System
IPCC ..... Intergovernmental Panel on Climate Change
JI ..... Joint Institute
JIMAR ..... Joint Institute for Marine and Atmosphere Research
JISAO ..... Joint Institute for the Study of the Atmosphere and Ocean
METOC ..... Meteorological and Oceanographic Command
MOA ..... Memorandum of Agreement
MOU ..... Memorandum of Understanding
MSI ..... Minority Serving Institutions
NACP ..... North American Carbon Program
NAO ..... North Atlantic Oscillation
NASA ..... National Aeronautics and Space Administration
NCAR ..... National Center for Atmospheric Research
NCEP ..... National Centers for Environmental Prediction
NESDIS ..... National Environmental Satellite Data and Information Service
NEXRAD ..... Next Generation Weather Radar
NHC/TPC ..... National Hurricane Center/Tropical Prediction Center
NIH ..... National Institutes of Health
NIST ..... National Institute of Standards and Technology

NM ..... Nautical Miles
NMFS ..... National Marine Fisheries Service
NOAA ..... National Oceanic and Atmospheric Administration
NOS ..... National Ocean Service
NSF ..... National Science Foundation
NSSL ..... National Severe Storms Laboratory
NURP ..... National Undersea Research Program
NWS ..... National Weather Service
OAR ..... Office of Oceanic and Atmospheric Research
OGP ..... Office of Global Programs
OMB ..... Office of Management and Budget
ONR ..... Office of Naval Research
ORPG ..... Open Radar Product Generator
OU ..... University of Oklahoma
PCB ..... Polychlorinated Biphenyl
PDO ..... Pacific Decadal Oscillation
PMEL ..... Pacific Marine Environmental Laboratory
PPBES ..... Planning, Programming, Budgeting, and Execution System
PPI ..... Office of Program Planning and Integration
R&D ..... Research and Development
ROTC ..... Reserve Officer Training Corps
RRT ..... Research Review Team
SAB ..... Science Advisory Board
SEC ..... Space Environment Center
SHIPS ..... Statistical Hurricane Intensity Prediction Scheme
TOGA ..... Tropical Ocean Global Atmosphere
TRL ..... Technology Readiness Level
UNH ..... University of New Hampshire
USWRP ..... United States Weather Research Program
VV&A ..... Verification, Validation, and Accreditation

AGENDA B-6
APRIL 2004

MEMORANDUM

TO: Council, SSC and AP Members

FROM: Chris Oliver
Executive Director

ESTIMATED TIME
6 hrs
all B items

DATE: March 23, 2004

SUBJECT: Update on Sea Otters

ACTION REQUIRED

Receive report from the US Fish & Wildlife Service on the status of listing the southwest Alaska Distinct Population Segment of the northern sea otter under the Endangered Species Act

BACKGROUND

The northern sea otter population in Alaska is comprised of three stocks, one of which, the southwest Alaska stock [see map, Item B-6(a)], called a Distinct Population Segment or DPS, has been declining in abundance over recent years. The reasons for the decline of the southwest Alaska DPS are unknown, but population studies indicate that increased adult mortality appears to be the source. Groundfish fisheries are not known to interact with sea otters, but this marine mammal does inhabit coastal areas near some fishing areas and ports. The southwest Alaska sea otter DPS inhabits coastal Alaska from the Cook Inlet/Kodiak area westward to the end of the Aleutian Islands.

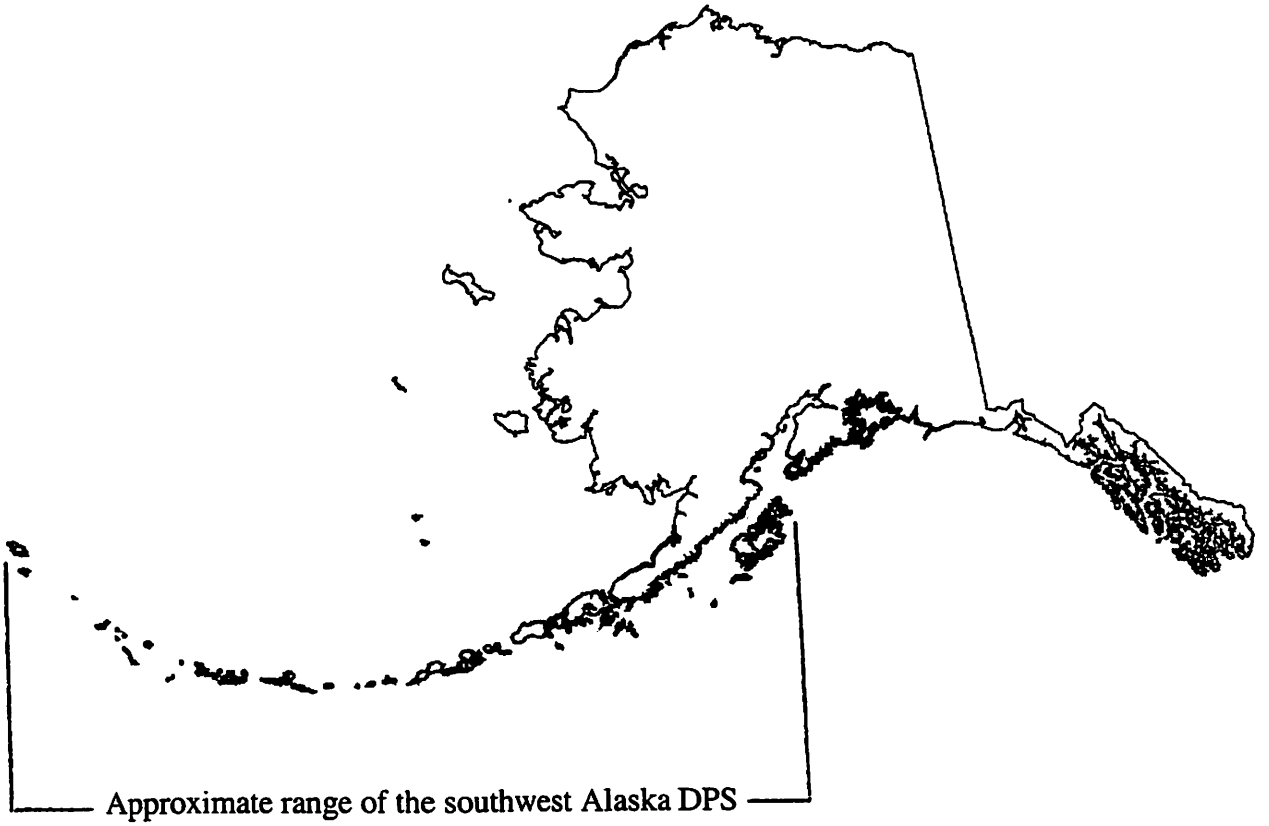
At the February Council meeting, the USFWS reported that the agency had published a Proposed Rule (69 FR 6600; Feb.11, 2004) to list the southwest Alaska DPS as threatened under the Endangered Species Act. In the Federal Register notice, the USFWS requests comments from the public concerning:

- Relevant biological or other data concerning any threat, or lack thereof, to this DPS
- The location of any additional populations of this DPS
- Physical or biological features or geographic areas the agency should consider in defining critical habitat, and any features or areas that should not be designated critical habitat
- Additional information on the range, distribution, and size of this DPS
- Current or planned activities in the areas inhabited by this DPS and their possible impacts on this DPS

Comments are due by June 10, 2004. The USFWS, Alaska Region, news release on the listing is attached as Item B-6(b).

Although it is unlikely that Alaska EEZ groundfish fisheries will be considered a threat to this population, the Council may wish to comment on the proposed listing. A representative from the USFWS will be available to discuss the status of the proposed ESA listing, and to answer questions.

Distribution of the northern sea otter in Alaska.



U.S. FISH AND WILDLIFE SERVICE
Region 7 - Alaska
1011 East Tudor Road
Anchorage, Alaska 99503
(907)786-3309 (TDD Available)

News

04-03

For Immediate Release

Contact: Bruce Woods (907) 786-3695

U.S. FISH AND WILDLIFE SERVICE PROPOSES LISTING SOUTHWEST ALASKA SEA OTTERS AS "THREATENED" UNDER ENDANGERED SPECIES ACT

The U.S. Fish and Wildlife Service is proposing to list the southwest Alaska Distinct Population Segment of the northern sea otter (*Enhydra lutris kenyoni*) as threatened under the Endangered Species Act (ESA.) A Proposed Rule regarding the listing was published today in the Federal Register. The Service will accept comments on the proposed rule for the next 120 days.

"We are proposing to list the sea otter population in southwest Alaska based on survey data indicating that it has declined dramatically over the last 10 to 15 years," said Rowan Gould, Regional Director of the Service's Alaska Region. "This population, which once contained more than half of the world's sea otters, has declined at least 56 to 68 percent since the mid-1980s and we have no indications that the decline has ceased."

Under the ESA, "species" is defined broadly to include species, subspecies, and also to include Distinct Population Segments, or DPS, of vertebrate species. A DPS is a portion of a vertebrate species or subspecies that is discrete from the remainder of its taxon and also is significant to that taxon. The ESA defines a "threatened " species as one that is likely to become endangered in the foreseeable future. An "endangered" species is defined as being in danger of extinction throughout all or a significant portion of its range.

The proposed rule describes the southwest Alaska DPS of the northern sea otter as occurring in nearshore waters from the Aleutian Islands to Cook Inlet, including waters adjacent to the Aleutians, the Alaska Peninsula, and the Kodiak archipelago. This corresponds to the range of the southwest stock of sea otters recognized in 2002 by the Service in accordance with provisions of the Marine Mammal Protection Act. Two other stocks of sea otters in Alaska that also were recognized in 2002, the southcentral and southeast stocks, are believed to be stable or increasing and are not included in the proposed rule published today.

Between the mid 1700s and the early 1900s, commercial hunting of sea otters brought the entire species to the brink of extinction. When they became protected from commercial harvest in 1911 under the International Fur Seal Treaty, only 13 small remnant populations were known to still exist, including six in southwest Alaska. Following this protection, otters from 11 of these populations gradually recovered and re-colonized their former range in southwest Alaska and some other portions of their historic range.

A substantial decline in the southwest Alaska otter population appears to have begun in the mid- to late 1980s. In the Aleutians, there were approximately 55,000 to 74,000 sea otters in the mid-1980s, representing almost half of the world's estimated population of sea otters at that time. Aerial surveys since that time, however, indicate a progressive decline in the number of otters in the Aleutians, where the current population is estimated to be less than 9,000 animals. Survey results also show substantial declines have occurred in the Alaska Peninsula, where the counts of otters have declined by more than 65 percent since the mid 1980s. In the Kodiak Archipelago, surveys indicate the number of otters has declined more than 55 percent since the

late1980s. Overall, the DPS has declined an estimated 56 to 68 percent over the past 10 to 15 years, and recent surveys indicate the decline is continuing.

The cause of the population decline is not clear. Production of young does not appear to be reduced, nor is there evidence that starvation, disease, or contaminants are involved. There also is no evidence that entanglement in commercial fishing gear or competition with fishermen for prey species is playing a significant role in the decline, and annual subsistence harvest by Alaska Natives is believed to be too low to contribute significantly to the decline. Some evidence points to predation by killer whales as a possible cause of the decline in the Aleutian Island chain. However, additional research will be needed before we can confidently identify the cause of the decline.

The proposed rule to list the southwest DPS of the otter as threatened does not include a proposal for designating critical habitat. As explained in the proposed rule, critical habitat is not determinable at this time. As part of the request for public comments on the proposal to list the DPS, the Service is seeking information regarding features and specific areas that the Service should consider for a critical habitat proposal, in the event that the listing becomes final. If the Service does propose critical habitat for the DPS in the future, the public would have an opportunity to comment on such a proposal.

If the southwest Alaska DPS of the sea otter is listed as threatened under the ESA, a recovery plan would be developed for it. This plan would bring together efforts by Federal, State, Alaska Native groups, local agencies, and private entities for the conservation of the DPS.

The Service invites the public to submit data, information, and comments on the proposed rule. The Service will accept comments on the proposed rule for the next 120 days, and during that time the Service also will hold one or more public hearings where the public can obtain information and offer comments. Requests for public hearings need to be received by the Service within the next 60 days. A copy of the proposed rule and other information about the proposal is available on the Internet at http://alaska.fws.gov/current.htm. Comments on the proposal can be emailed to fw7_swakseaotter@fws.gov.

You can subscribe to the U.S. Fish and Wildlife Service, Alaska Region listserver to have our press releases sent to your e-mail address automatically by sending a message to: listserv@www.fws.gov. Please indicate that you would like to subscribe to FWS-Alaska news and give your name in the body of the message.

The U.S. Fish and Wildlife Service is the principal federal agency responsible for conserving, protecting, and enhancing fish, wildlife, and plants and their habitats for the continuing benefit of the American people. The Service manages the 95-million-acre National Wildlife Refuge System, which encompasses 542 national wildlife refuges, thousands of small wetlands and other special management areas. It also operates 69 national fish hatcheries, 64 fishery resource offices, and 81 ecological services field stations. The agency enforces federal wildlife laws, administers the Endangered Species Act, manages migratory bird populations, restores nationally significant fisheries, conserves and restores wildlife habitat such as wetlands, and helps foreign governments with their conservation efforts. It also oversees the Federal Aid program that distributes hundreds of millions of dollars in excise taxes on fishing and hunting equipment to state fish and wildlife agencies.

- FWS

For more information about the U.S. Fish and Wildlife Service, visit our home page at http://www.fws.gov

affected small and rural entities some relief from E911 by providing small entities with longer implementation periods than larger, more financially flexible entities that are better able to buy the equipment necessary to successful 911 and E911 implementation and to first attract the attention of equipment manufacturers. We again seek comment on such possible alternatives.

33. In its discussion of MSS, the *Second Further Notice* recognizes that although satellite carriers face unique technical difficulties in implementing both basic and enhanced 911 features, these difficulties are avoided to a larger extent when the carrier has an ancillary terrestrial component (ATC) to its service. Thus, in paragraphs 107–110, the *Second Further Notice* examines the impact of ATC on MSS providers' ability to offer the same enhanced 911 service that terrestrial wireless carriers provide. Paragraph 108 of the *Second Further Notice* notes that several commenters, thus far, have indicated that MSS basic and enhanced 911 service can be improved with ATC. The *Second Further Notice* suggests alternative solutions to this problem, asking whether MSS providers with ATC should be allowed additional time (or transition periods) in order to come into compliance with terrestrial E911 rules, and whether they can meet the location identification standards of § 20.18 (47 CFR 20.18). The *Second Further Notice* also directs the Network Reliability and Interoperability Council to study issues associated with hand-off of calls between satellite and terrestrial components.

34. As mentioned, the *Second Further Notice* seeks comment on reporting and recordkeeping proposals in connection with implementation of the MSS emergency call center requirement. Call center 911 service is a new form of 911 service, and the *Second Further Notice* seeks comment on the collection of call center data, including total volume of calls received during a given period, the number of calls requiring forwarding to a PSAP, and the success rate in handing off the call to an appropriate PSAP. The *Second Further Notice* suggests alternatives for this data collection, seeking comment on whether the information should simply be retained by service providers and available upon Commission request, whether the information should be submitted to the Commission on a regular basis, or whether the information should be submitted to a third party for review. In addition, the *Second Further Notice* seeks comment on whether the proposed data collection/recordkeeping requirement should be subject to sunset provisions.

35. The *Second Further Notice*, in paragraphs 113–117, examines potential 911 and E911 requirements for multi-line telephone systems. In that regard, the Commission considers whether to impose such regulations on a national basis or whether it is sufficient to rely on actions by state and local authorities to ensure reliable coverage. NENA and APCO, for example, have proposed Model Legislation that would allow states, through legislation, to adopt many of the standards and protocol association with delivering E911 services through multi-line systems. Paragraph 117 considers adopting NENA's proposed new section to our part 64 rules requiring that LEC central offices be provisioned to permit connection of MLTS equipment for E911 purposes in any accepted industry standard format, as defined by the Commission, requested by the MLTS operator. In connection with this recommendation, the *Second Further Notice* seeks comment on NEC's recommendation that the Commission adopt the ANSI T1.628–2000 ISDN network interface standard as an "accepted industry standard," thereby requiring LECs to enable MLTS operators to use a more efficient means of interfacing with the network than is currently available in most instances. Additionally, the *Second Further Notice* asked parties to comment on whether any rules that the Commission adopts may have a disproportionate impact on small entities and requested comment how it might ameliorate any such impacts.

F. Federal Rules That Overlap, Duplicate, or Conflict With the Proposed Rules

36. None.

III. Ordering Clauses

37. Pursuant to sections 1, 4(i), 7, 10, 201, 202, 208, 214, 222(d)(4)(A)-(C), 222(f), 222(g), 222(h)(1)(A), 222(h)(4)-(5), 251(e)(3), 301, 303, 308, and 310 of the Communications Act of 1934, as amended, 47 U.S.C. 151, 154(i), 157, 160, 201, 202, 208, 214, 222(d)(4)(A)–(C), 222(f), 222(g), 222(h)(1)(A), 222(h)(4)–(5), 251(e)(3), 301, 303, 308, 310, this *Report and Order* is hereby *adopted.*

38. The Commission's Office of Consumer and Government Affairs, Reference Information Center, *shall send* a copy of this *Report and Order and Second Further Notice of Proposed Rulemaking*, including the Final Regulatory Flexibility Analysis and the Initial Regulatory Flexibility Analysis, to the Chief Counsel for Advocacy of the Small Business Administration.

List of Subjects in 47 CFR Parts 20, 25, 64, and 68

Communications common carriers, satellite communications.

Federal Communications Commission.

William F. Caton,

Deputy Secretary.

[FR Doc. 04–2125 Filed 2–10–04; 8:45 am]

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DEPARTMENT OF THE INTERIOR

Fish and Wildlife Service

50 CFR Part 17

RIN 1018–AI44

Endangered and Threatened Wildlife and Plants; Listing the Southwest Alaska Distinct Population Segment of the Northern Sea Otter (*Enhydra lutris kenyoni*) as Threatened

AGENCY: Fish and Wildlife Service, Interior.

ACTION: Proposed rule.

SUMMARY: We, the Fish and Wildlife Service (Service), propose to list the southwest Alaska distinct population segment of the northern sea otter (*Enhydra lutris kenyoni*) as threatened under the authority of the Endangered Species Act of 1973, as amended (Act). Once containing more than half of the world's sea otters, this population segment has undergone a precipitous population decline of at least 56–68 percent since the mid-1980s.

DATES: We will consider comments on this proposed rule received until the close of business on June 10, 2004. Requests for public hearings must be received by us on or before April 12, 2004.

ADDRESSES: If you wish to comment, you may submit your comments and materials concerning this proposal by any one of several methods:

1. You may submit written comments to the Supervisor, U.S. Fish and Wildlife Service, Marine Mammals Management Office, 1011 East Tudor Road, Anchorage, Alaska 99503.

2. You may hand deliver written comments to our office at the address given above.

3. You may send comments by electronic mail (e-mail) to: *fw7_swakseaotter@fws.gov. See* the Public Comments Solicited section below for file format and other information about electronic filing.

FOR FURTHER INFORMATION CONTACT: Douglas Burn, (*see* ADDRESSES) (telephone 907/786–3800; facsimile 907/786–3816).

SUPPLEMENTARY INFORMATION:

Background

The sea otter (*Enhydra lutris*) is a mammal in the family Mustelidae and it is the only species in the genus *Enhydra*. There are three recognized subspecies (Wilson *et al.* 1991): *E. l. lutris*, known as the northern sea otter, occurs in the Kuril Islands, Kamchatka Peninsula, and Commander Islands in Russia; *E. l. kenyoni*, also known as the northern sea otter, has a range that extends from the Aleutian Islands in southwestern Alaska to the coast of the State of Washington; and *E. l. nereis*, known as the southern sea otter, occurs in coastal southern California and is known as the southern sea otter. Figure 1 illustrates the approximate ranges of the three subspecies.

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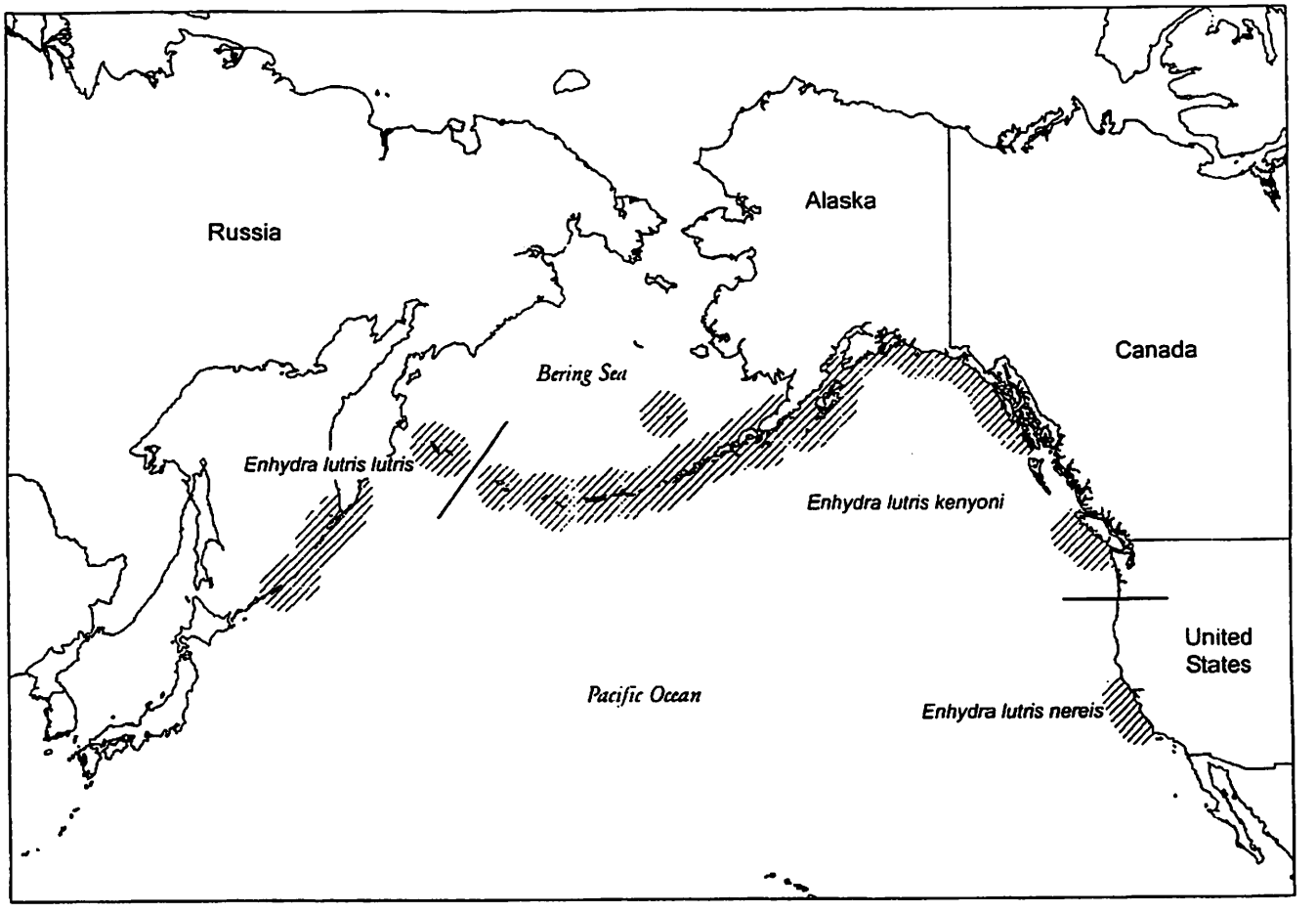

Figure 1. Present distribution of three supspecies of sea otters (hatched areas).

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The two subspecies of northern sea otter are separated by an expanse of open water that measures approximately 320 kilometers (km) (200 miles (mi)) between the Commander Islands in Russia, at the northeastern edge of the range of *E. l. lutris*, and the Near Islands of the United States, which are the northwestern edge of the range of *E. l. kenyoni*. Wide, deep-water passes are an effective barrier to sea otter movements (Kenyon 1969) and thus interaction between these two subspecies is considered very unlikely. (*See* later sections on food habits and animal movements.)

The southernmost extent of the range of *E. l. kenyoni* is in Washington state and British Columbia, and is the result of translocations of sea otters from Alaska between 1969 and 1972 (Jameson *et al.* 1982). The Washington and British Columbia population is separated from the nearest sea otters in Alaska by a distance roughly of 483 km (300 mi) to the north, and is separated from the southern sea otter (*E. l. nereis*) by a distance of more than 965 km (600 mi) to the south.

The sea otter is the smallest species of marine mammal in the world. Adult males average 130 centimeters (cm) (4.3 feet (ft)) in length and 30 kilograms (kg) (66 pounds (lbs)) in weight; adult females average 120 cm (3.9 ft) in length and 20 kg (44 lbs) in weight (Kenyon 1969). The northern sea otter in Russian waters (*E. l. lutris*) is the largest of the three subspecies, characterized as having a wide skull with short nasal bones (Wilson *et al.* 1991). The southern sea otter (*E. l. nereis*) is smaller and has a narrower skull with a long rostrum and small teeth. The northern sea otter in Alaska (*E. l. kenyoni*) is intermediate in size and has a longer mandible than either of the other two subspecies.

Sea otters lack the blubber layer found in most marine mammals and depend entirely upon their fur for insulation (Riedman and Estes 1990). Their pelage consists of a sparse outer layer of guard hairs and an underfur that is the densest mammalian fur in the world, averaging more than 100,000 hairs per square centimeter (645,000 hairs per square inch) (Kenyon 1969). As compared to pinnipeds (seals and sea lions) that have a distinct molting season, sea otters molt gradually throughout the year (Kenyon 1969).

Sea otters have a much higher rate of metabolism than land mammals of similar size (Costa 1978; Costa and Kooyman 1982, 1984). To maintain the level of heat production required to sustain them, sea otters eat large amounts of food, estimated at 23–33 percent of their body weight per day (Riedman and Estes 1990). Sea otters are carnivores that primarily eat a wide variety of benthic (living in or on the sea floor) invertebrates, including sea urchins, clams, mussels, crabs, and octopus. In some parts of Alaska, sea otters also eat epibenthic (living upon the sea floor) fishes (Estes *et al.* 1982; Estes 1990).

Much of the marine habitat of the sea otter in southwest Alaska is characterized by a rocky substrate. In these areas, sea otters typically are concentrated between the shoreline and the outer limit of the kelp canopy (Riedman and Estes 1990). Sea otters also inhabit marine environments that have soft sediment substrates, such as Bristol Bay and the Kodiak archipelago. As communities of benthic invertebrates differ between rocky and soft sediment substrate areas, so do sea otter diets. In general, prey species in rocky substrate habitats include sea urchins, octopus, and mussels, while in soft substrates, clams dominate the diet.

Sea otters are considered a keystone species, strongly influencing the composition and diversity of the nearshore marine environment they inhabit (Estes *et al.* 1978). For example, studies of subtidal communities in Alaska have demonstrated that, when sea otters are abundant, epibenthic herbivores such as sea urchins will be present at low densities whereas kelp, which are consumed by sea urchins, will flourish. Conversely, when sea otters are absent, abundant sea urchin populations create areas of low kelp abundance, known as urchin barrens (Estes and Harrold 1988).

Sea otters generally occur in shallow water areas that are near the shoreline. They primarily forage in shallow water areas less than 100 meters (m) (328 feet (ft)) in depth, and the majority of all foraging dives take place in waters less than 40 m (131 ft) in depth. As water depth is generally correlated with distance to shore, sea otters typically inhabit waters within 1–2 km (0.62–1.24 mi) of shore (Riedman and Estes 1990). One notable exception occurs along the coast of Bristol Bay, along the north side of the Alaska Peninsula, where a broad shelf of shallow water extends several miles from shore. Prior to the onset of the sea otter population decline (described below), large rafts of sea otters were commonly observed above this shelf of shallow water at distances as far as 40 km (25 mi) from shore (Schneider 1976).

Since the end of the commercial fur harvests, movement patterns of sea otters have been influenced by the processes of natural population recolonization and the translocation of sea otters into former habitat. While sea otters have been known to make long distance movements up to 350 km (217 mi) over a relatively short period of time when translocated to new or vacant habitat (Ralls *et al.* 1992), the home ranges of sea otters in established populations are relatively small. Once a population has become established and has reached a relatively steady state within the habitat, movement of individual sea otters appears to be largely dictated by social behaviors and by factors in the local environment, including gender, breeding status, age, climatic variables (*e.g.* weather, tidal state, season), and human disturbance, as described below.

Home range and movement patterns of sea otters vary depending on the gender and breeding status of the otter. In the Aleutian Islands, breeding males remain for all or part of the year within the bounds of their breeding territory, which constitutes a length of coastline anywhere from 100 m (328 ft) to approximately 1 km (0.62 mi). Sexually mature females have home ranges of approximately 8–16 km (5–10 mi), which may include one or more male territories. Male sea otters that are not part of the breeding population do not hold territories and may move greater distances between resting and foraging areas than breeding males (Lensink 1962, Kenyon 1969, Riedman and Estes 1990, Estes and Tinker 1996).

Studies of movement patterns of juvenile sea otters found that juvenile males (1–2 years of age) were found to disperse later and for greater distances, up to 120 km (75 mi), from their natal (birth) area than 1-year-old females, for which the greatest distance traveled was 38 km (23.6 mi) (Garshelis and Garshelis 1984, Monnett and Rotterman 1988, Riedman and Estes 1990). Intraspecific aggression between breeding males and juvenile sea otters may cause juvenile otters to move from their natal areas to lower quality habitat (Ralls *et al.* 1996), and survival of juvenile sea otters, though highly variable, is influenced by intraspecific aggression and dispersal (Ballachey *et al.* in litt.).

Sea otter movements are also influenced by local climatic conditions such as storm events, prevailing winds, and in some areas, tidal state. Sea otters tend to move to protected or sheltered waters (bays, inlets, or lees) during storm events or high winds. In calm weather conditions, sea otters may be encountered further from shore (Lensink 1962, Kenyon 1969). In the Commander Islands, Russia , weather, season, time of day, and human disturbance have been cited as factors that induce sea

otter movement (Barabash-Nikiforov 1947, Barabash-Nikiforov *et al.* 1968).

Due to their dependence on shallow water feeding areas, most sea otters in Alaska occur within 1–2 km (0.62–1.24 mi) from shore. Thus, most sea otters are within State-owned waters, which include the area from mean high tide to 4.8 km (3 miles) offshore, and any that go further offshore are within the U.S. Exclusive Economic Zone, which extends 370.4 km (200 nautical miles) seaward from the coast of the United States.

While sea otters typically sleep in the water, they also haul out and sleep on shore (Kenyon 1969). Female sea otters have also been observed to give birth while on shore (Barabash-Nikiforov *et al.* 1968, Jameson 1983). Although they typically haul out and remain close to the water's edge, sea otters have been observed on land at distances up to several hundred meters from the water (Riedman and Estes 1990). The majority of coastal lands within the range of the southwest Alaska population of the northern sea otter are part of our National Wildlife Refuge (NWR) system, including Alaska Maritime NWR, Izembek NWR, Alaska Peninsula/Becharof NWR, and Kodiak NWR. The National Park Service also has large parcels of coastal lands in southwest Alaska, including Katmai National Park and Aniakchak National Monument and Preserve. The vast majority of remaining coastal lands in southwest Alaska are owned by the State of Alaska and Alaska Native Corporations. Privately owned lands constitute a very minor proportion of coastal lands in southwest Alaska.

Female sea otters in Alaska live an estimated 15–20 years, while male lifespan appears to be about 10–15 years (Calkins and Schneider 1985). First-year survival of sea otter pups is generally substantially lower than that for prime age (2–10 years old) animals (Monson and DeGange 1995, Monson *et al.* 2000). Male sea otters appear to reach sexual maturity at 5–6 years of age (Schneider 1978, Garshelis 1983). The average age of sexual maturity for female sea otters is 3–4 years, but some appear to reach sexual maturity as early as 2 years of age. The presence of pups and fetuses at different stages of development throughout the year suggests that reproduction occurs at all times of the year. Some areas show evidence of one or more seasonal peaks in pupping (Rotterman and Simon-Jackson 1988).

Similar to other mustelids, sea otters can have delayed implantation of the blastocyst (developing embryo) (Sinha *et al.* 1966). As a result, pregnancy can have two phases: from fertilization to implantation, and from implantation to birth (Rotterman and Simon-Jackson 1988). The average time between copulation and birth is around 6–7 months. Female sea otters typically will not mate while accompanied by a pup (Lensink 1962; Kenyon 1969; Schneider 1978; Garshelis *et al.* 1984). Although females are physically capable of producing pups annually, the length of pup dependency may be the primary factor determining pupping interval.

Maximum productivity rates have not been measured through much of the sea otter's range in Alaska. Estes (1990) estimated a population growth rate of 17–20 percent per year for four northern sea otter populations expanding into unoccupied habitat. In areas where resources are limiting or where populations are approaching equilibrium density, slower rates of growth are expected. Equilibrium density is defined as the average density, relatively stable over time, that can be supported by the habitat (Estes 1990).

Distribution and Status

Historically, sea otters occurred throughout the coastal waters of the north Pacific Ocean, from the northern Japanese archipelago around the north Pacific rim to central Baja California, Mexico. The historic distribution of sea otters is depicted in Figure 2.

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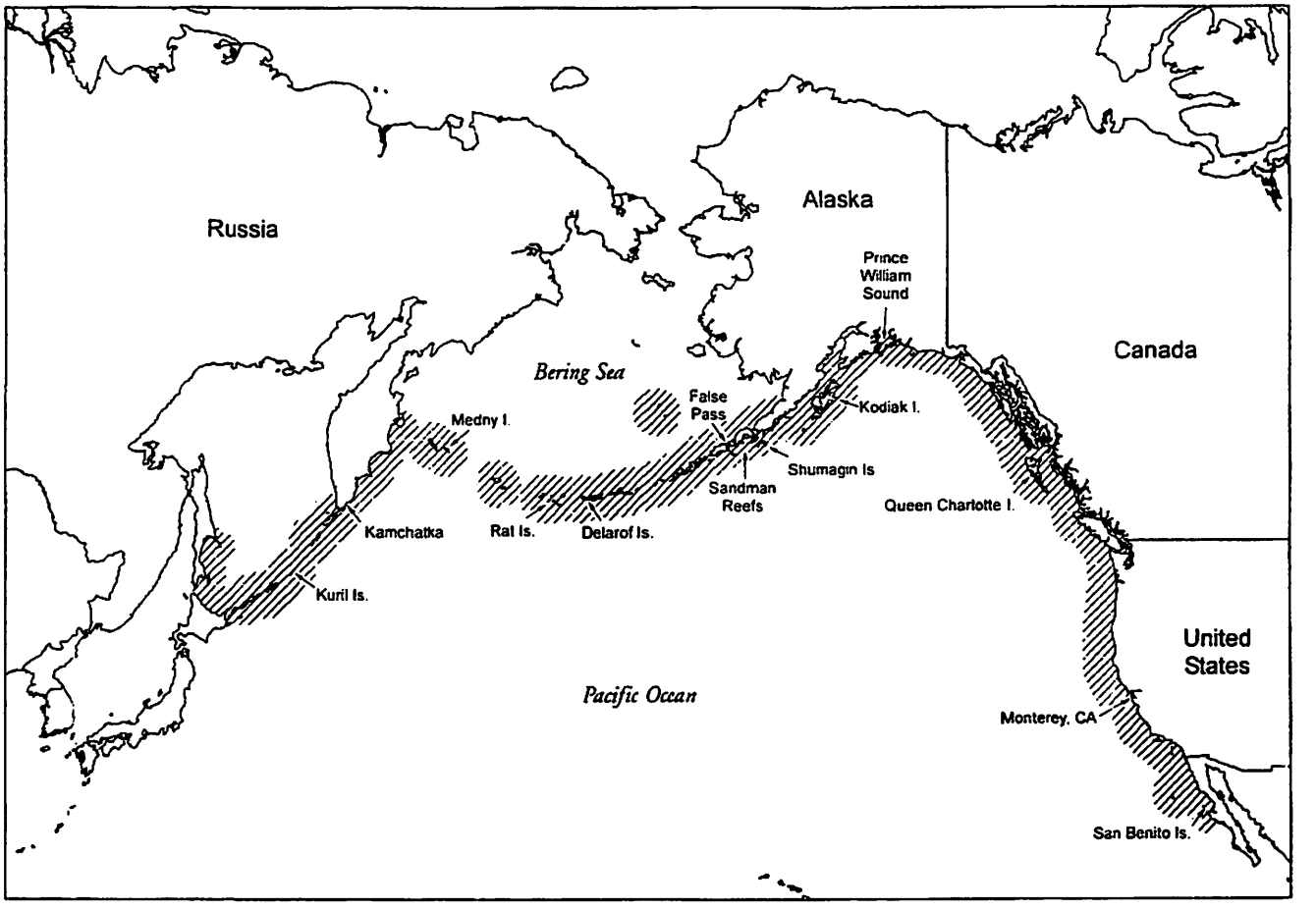

Figure 2. Worldwide distribution of sea otters prior to commercial exploitation (hatched areas) and location of remnant colonies in 1911 (arrows).

Prior to commercial exploitation, the range-wide estimate for the species was 150,000–300,000 individuals (Kenyon 1969, Johnson 1982). Commercial hunting of sea otters began shortly after the Bering/Chirikof expedition to Alaska in 1741. Over the next 170 years, sea otters were hunted to the brink of extinction first by Russian, and later by American fur hunters.

Sea otters became protected from commercial harvests under the International Fur Seal Treaty of 1911, when only 13 small remnant populations were known to still exist (Figure 2). The entire species at that time may have been reduced to only 1,000–2,000 animals. Two of the 13 remnant populations (Queen Charlotte Island and San Benito Islands) subsequently became extinct (Kenyon 1969, Estes 1980). The remaining 11 populations began to grow in number, and expanded to recolonize much of the former range. Six of the remnant populations (Rat Islands, Delarof Islands, False Pass, Sandman Reefs, Shumagin Islands, and Kodiak Island) were located within the bounds of what we now recognize as the southwest Alaska population of the northern sea otter (*see* Distinct Vertebrate Population Segment, below). These remnant populations grew rapidly during the first 50 years following protection from further commercial hunting. At several locations in the Aleutian Islands, the rapid growth of sea otter populations appears to have initially exceeded the carrying capacity of the local environment, as sea otter abundance at these islands then declined, either by starvation or emigration, eventually reaching what has been described as "relative equilibrium" (Kenyon 1969).

Population Trends of Sea Otters in Southwest Alaska

The following discussion of population trends is related to the southwest Alaska distinct population segment of sea otters addressed in this proposed rule. The southwest Alaska population ranges from Attu Island at the western end of Near Islands in the Aleutians, east to Kamishak Bay on the western side of lower Cook Inlet, and includes waters adjacent to the Aleutian Islands, the Alaska Peninsula, the Kodiak archipelago, and the Barren Islands (Figure 3).

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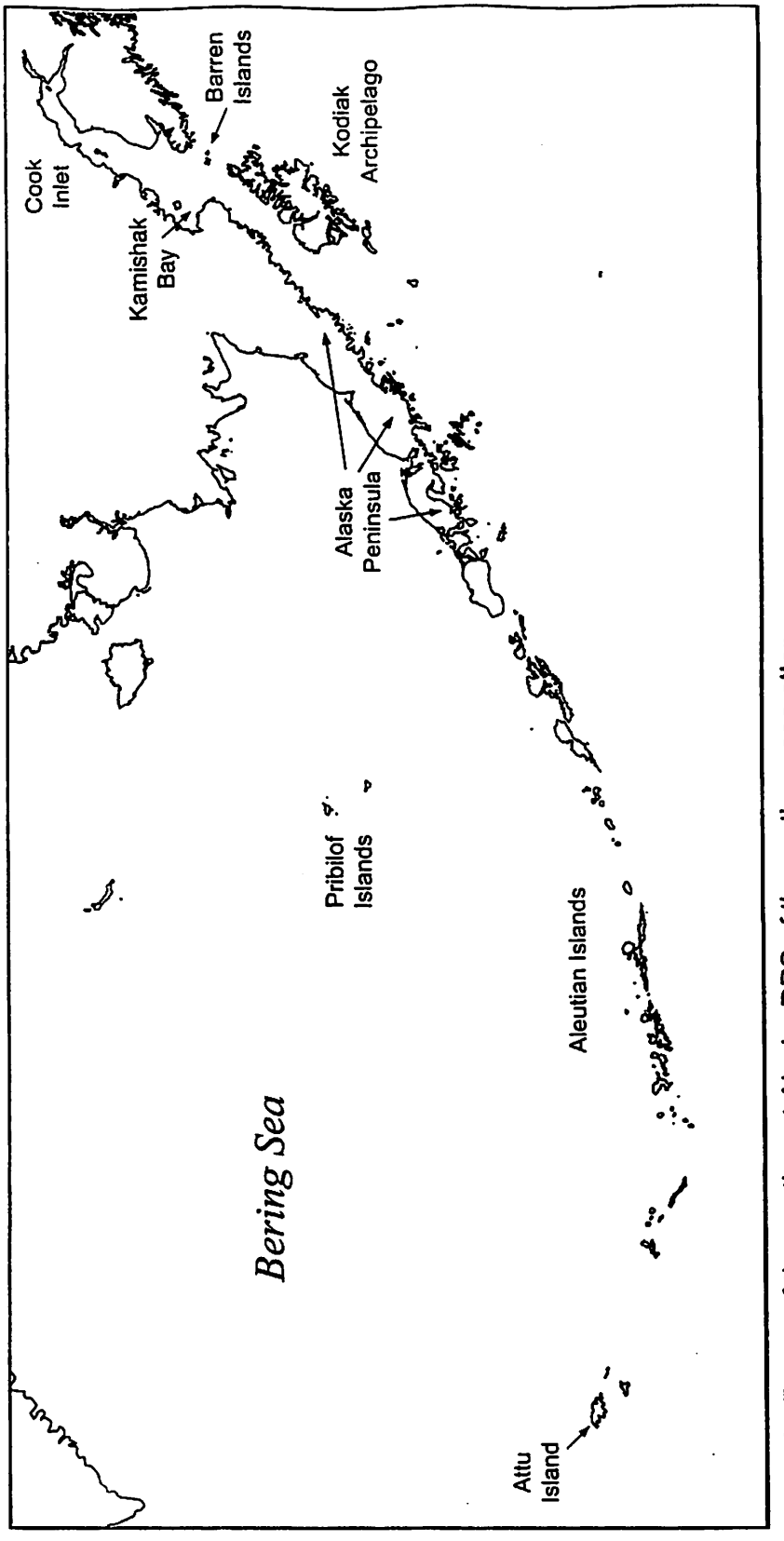

Figure 3. Range of the southwest Alaska DPS of the northern sea otter.

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Survey procedures vary in different locations. In some parts of southwest Alaska, sea otters have been counted in a narrow band of water adjacent to the shoreline; in others, transects by boat or plane have been used to sample an area, and the resulting sea otter density is extrapolated to generate a population estimate for the entire study area. Like survey efforts of most species, detection of all the individuals present is not always possible. Sea otters spend considerable time under water, and it is not possible to detect individuals that are below the surface at the time a survey is conducted. Also, observers do not always detect every individual present on the surface. Only a few surveys have been conducted using methods that allow for calculation of a correction factor to adjust for the estimated proportion of otters not detected by observers. Making such an adjustment entails having an independent estimate of the number of otters present in an area, also known as "ground-truth," and combining it with the regular survey data in order to calculate a correction factor to adjust for sea otters not detected during the survey. Thus, survey results can be of several types: They can be direct counts or estimates, and in either case they may be adjusted or unadjusted for sea otters not detected by observers.

In the following discussion of population trends, results are presented separately for surveys conducted in the Aleutian Islands, the Alaska Peninsula, the Kodiak Archipelago, and Kamishak Bay. For the Alaska Peninsula, results are presented for the separate surveys that have been conducted for north Peninsula offshore areas, south Peninsula offshore areas, south Alaska Peninsula Islands, and the South Alaska Peninsula shoreline. The general locations of the survey areas are depicted in Figure 4 A–D.

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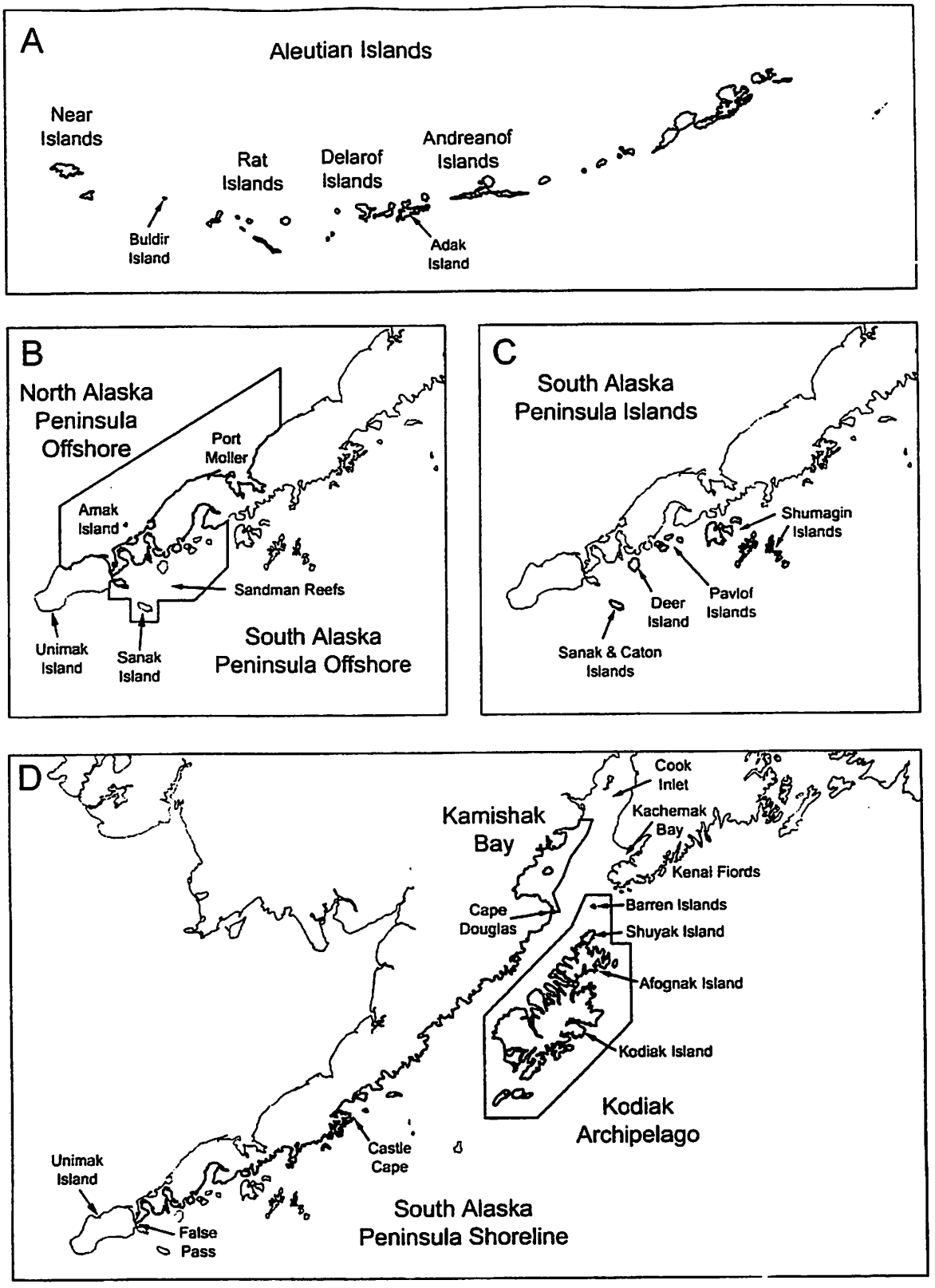

Figure 4 A-D. Sea otter survey areas in southwest Alaska.

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Unless otherwise specified, the survey results are unadjusted for otters not detected by observers. Within each study area, recent surveys were conducted using methods similar to those used in the past, so that counts or estimates would be as comparable as possible with baseline information for that area. Although there may be slight differences in the time of year that surveys were conducted, we do not believe these timing differences hinder comparisons of survey results because otters are likely to remain in the same general area, as they are not migratory. A summary of sea otter survey data from each survey area within the southwest Alaska population is presented in Table 1, followed by a narrative description of the results for each area.

TABLE 1.—SUMMARY OF SEA OTTER POPULATION SURVEYS IN SOUTHWEST ALASKA

[Estimates include 95% confidence intervals where available. Estimates for the Kodiak archipelago and Kamishak Bay are the only values adjusted for sea otters not detected.]

Survey Area	Year	Count or estimate	Source
Aleutian Islands	1965	9,700	Kenyon (1969).
	1992	8,048	Evans *et al.* (1997).
	2000	2,442	Doroff *et al.* (2003).
North Alaska Peninsula Offshore Areas	1976	11,681	Schneider (1976).
	*1986	6,474 ± 2,003 (JUN)	Brueggerman *et al.* (1988), Burn and Doroff in prep.
		9,215 ± 3,709 (AUG)	
		7,539 ± 2,103 (OCT)	
South Alaska Peninsula Offshore Areas	*1986	13,900 ± 6,456 (MAR)	Brueggerman *et al.* (1988). Burn and Doroff in prep.
		14,042 ± 5,178 (JUN)	
		17,500 ± 5,768 (OCT)	
	2001	1,005 ± 1,597 (APR)	Burn and Doroff in prep.
South Alaska Peninsula Islands	1962	2,195	Kenyon (1969).
	1986	2,122	Brueggeman *et al.* (1988).
	1989	1,589	DeGange *et al.* (1995).
	2001	405	Burn and Doroff in prep.
South Alaska Peninsula Shoreline	1989	2,632	DeGange *et al.* (1995).
	2001	2,651	Burn and Doroff in prep.
Kodiak Archipelago	1989	13,526 ± 2,350	DeGange *et al.* (1995).
	1994	9,817 ± 5,169	Doroff *et al.* (in prep.).
	2001	5,893 ± 2,630	Doroff *et al.* (in prep.).
Kamishak Bay	2002	6,918 ± 4,271	USGS in litt. (2002).

* Estimates recalculated by the Service (Burn and Doroff in prep.) from original data of Brueggeman *et al* (1988).

Aleutian Islands

The first systematic, large-scale population surveys of sea otters in the Aleutian Islands (Figure 4A) were conducted from 1957 to 1965 by Kenyon (1969). The descendants of two remnant colonies had expanded throughout the Rat, Delarof, and western Andreanof Island groups. The total unadjusted count for the entire Aleutian archipelago during the 1965 survey was 9,700 sea otters. In 1965, sea otters were believed to have reached equilibrium densities at roughly one-third of the Aleutian archipelago, ranging from Adak Island in the east to Buldir Island in the west (Estes 1990). Islands in the other two-thirds of the archipelago had few sea otters, and researchers expected additional population growth in the Aleutian to occur through range expansion.

From the mid-1960's to the mid-1980's, otters expanded their range, and presumably their numbers as well, until they had recolonized all the major island groups in the Aleutian. Although the exact size of the sea otter population at the onset of the decline is unknown, a habitat-based computer model estimates the pre-decline population in the late-1980s may have numbered approximately 74,000 individuals (Burn *et al.* 2003).

In a 1992 aerial survey of the entire Aleutian archipelago we counted a total of 8,048 otters (Evans *et al.* 1997), approximately 1,650 (19 percent) fewer than the total reported for the 1965 survey. Although sea otters had recolonized all major island groups, they had unexpectedly declined in number by roughly 50 percent in portions of the western and central Aleutian since 1965, based on a comparison of the 1965 and 1992 survey results. Sea otter surveys conducted from skiffs during the mid-1990s at several islands also indicated substantial declines in the western and central Aleutians (Estes et *al.* 1998). It was not known at the time if these observed declines were due to an actual reduction in numbers of sea otters or a redistribution of otters between Aleutian Islands.

In April 2000, we conducted another complete aerial survey of the Aleutian archipelago. We counted 2,442 sea otters, which is a 70-percent decline from the count eight years previously (Doroff *et al.* 2003). Along the more than 5,000 km (3,107 miles) of shoreline surveyed, sea otter density was at a uniformly low level. this result showed clearly that a decline in abundance of sea otters in the archipelago had occurred, as opposed to redistribution among islands.

The aerial and skiff survey data both indicate that the onset of the decline began in the latter half of the 1980s or early 1990s. Doroff *et al.* (2003) have calculated that the decline proceeded at an average rate of −17.5 percent per year in the Aleutians. Although otters had declined in all island groups within the archipelago, the greatest declines were observed in the Rat, Delarof, and Andreanof Island groups. this result was unexpected, as the remnant colonies in these island groups were the first to recover from the effects of commercial harvests, and sea otters were believed to have been at equilibrium density at most of these islands in the mid-1960s.

The current estimate of the population in the Aleutian Islands is 8,742 sea otters. This estimate is based on results of the survey conducted in April of 2000, adjusted for otters not detected.

Alaska Peninsula

Three remnant colonies (at False Pass, Sandman Reefs, and Shumagin Islands) were believed to have existed near the western end of the Alaska Peninsula

after commercial fur harvests ended in 1911 (Kenyon 1969). During surveys in the late 1950s and early 1960s, substantial numbers of sea otters were observed between Unimak Island and Amak Island (2,892 in 1965) on the north side of the Peninsula, and around Sanak Island and the Sandman reefs (1,186 in 1962), and the Shumagin Islands on the south side (1,352 in 1962) (Kenyon 1969).

As summarized in Table 1 and described below, surveys of sea otters along the Alaska Peninsula have covered four areas, with the same method being used in a given area. For the north Alaska Peninsula offshore area (Figure 4B), shoreline counts are not an appropriate survey method due to the broad, shallow shelf in Bristol Bay, a condition under which sea otters occur further from the shore than elsewhere. Consequently, the north Alaska Peninsula offshore area has been surveyed from aircraft using north-south transects extending from the shoreline out over the shelf. Using this method, Schneider (1976) calculated an unadjusted population estimate of 11,681 sea otters on the north side of the Alaska Peninsula in 1976, which he believed to have been within the carrying capacity for that area. Brueggeman *et al.* (1988) conducted replicate surveys of the same area during three time periods in 1986. We re-analyzed the original 1986 survey data to address computational errors in the survey report; our re-calculated estimates range from 6,474–9,215 sea otters for this area for the three surveys in 1986 (Burn and Doroff in prep.). In May 2000, we replicated the survey design of Brueggeman *et al.* (1988) using identical survey methods. The 2000 survey estimate of 4,728 sea otters indicates abundance on the north side of the Alaska Peninsula had fallen by 27–49 percent in comparison with the minimum and maximum point estimates of the 1986 survey (Burn and Doroff in prep.).

We believe the decline in this particular area may have been even greater than these results indicate, as the severity of sea ice in Bristol Bay makes the North Alaska Peninsula the only area where seasonal differences in the distribution of otters are likely to occur. Substantially more otters were counted in transects of the Port Moller area in the May 2000 survey than in the 1986 surveys, which occurred later in the year. Large aggregations of sea otters in Port Moller may be a seasonal phenomenon related to sea ice; overflights in July and August, when the sea ice has left, have not recorded large numbers of sea otters in this area (B. Murphy, Alaska Department of Fish and Game, in litt. 2002). Consequently, had the May 2000 survey been conduced later (*e.g.* July or August) when the sea ice and the otters were more dispersed, it seems likely that fewer would have been in the Port Moller transect areas, which would have resulted in a lower count in the 2000 survey.

Offshore areas on the south side of the Alaska Peninsula (Figure 4B) were surveyed at three different time periods in 1986 (Brueggeman *et al.* 1988). Noting computational errors in the survey report, we re-analyzed the original 1986 survey data, resulting in estimates of 13,900–17,500 sea otters for the three surveys conducted in 1986 (Burn and Doroff in prep.). We replicated the survey in April 2001, when our estimate of 1,005 otters for the south Alaska Peninsula offshore area indicated a decline in abundance of at least 93 percent when compared with the minimum and maximum point estimates in this area from the 1986 surveys. Specific areas of high sea otter concentrations in 1986, such as Sandman Reefs, were almost devoid of sea otters in 2001 (Burn and Doroff in prep.).

Several island groups along the south side of the Alaska Peninsula (Figure 4C; Pavlof and Shumagin Islands, as well as Sanak, Caton, and Deer Islands) are another survey area. In 1962, Kenyon (1969) counted 1,900 otters along these islands. Twenty-four years later, in 1986, Brueggeman *et al.* (1988) counted 2,122 otters in the same survey area. In 1989, DeGange *et al.* (1995) counted 1,589 otters along the shorelines of the islands that had been surveyed in 1962 and 1986, which was approximately 16–28 percent fewer sea otters than were reported in the earlier counts. This decrease was the first indication of a sea otter population decline in the area of the Alaska Peninsula. When we counted sea otters in these island groups in 2001 we recorded only 405 individuals (Burn and Doroff in prep.), which is an 81-percent decline from the 1986 count reported by Brueggeman *et al.* (1988).

The shoreline of the Alaska Peninsula from False Pass to Cape Douglas (Figure 4D) is another survey area. In 1989, DeGange *et al.* (1995) counted 2,632 sea otters along this stretch of shoreline. In 2001 we counted 2,651 sea otters (Burn and Doroff in prep.), nearly the same as the 1989 count. When we subdivided and compared the results for the eastern and western components of the survey areas, we found that the count along the eastern end of the Peninsula, from Cape Douglas to Castle Cape, increased approximately 20 percent, from 1,766 in 1989 to 2,115 in 2001. For the western end of the Peninsula from False Pass to Castle Cape, however, there was evidence of a population decline, with 866 counted in 1989 as compared to 536 in 2001, a drop of almost 40 percent. (We also counted 42 sea otters along the shoreline of Unimak Island in 2001, but there is no suitable baseline data for comparison.) Based on what is known about sea otter movements and the distance between the eastern and western ends of the Peninsula, we believe that it is unlikely that these observations represent a change in distribution.

The results from the different survey areas along the Alaska Peninsula indicate various rates of change. Overall, the combined counts for the Peninsula have declined by 65–72 percent since the mid-1980s, based on the data presented in Table 1.

We have calculated an estimate of the current population for the entire Alaska Peninsula, including an adjustment for otters not detected by observers. In making this calculation, we first revised the combined total number of sea otters observed during the most recent surveys (8,789), to account for potential double-counting in an area of overlap between two of the study areas along the Peninsula. We then multiplied this revised number of otters (8,328) by the correction factor of 2.38 provided by Evans *et al.* (1997) for the type of aircraft used, to account for otters not detected by observers. The result is an adjusted estimate of 19,821 sea otters along the Alaska Peninsula as of 2001 (Burn and Doroff in prep.).

Kodiak Archipelago

One of the remnant sea otter colonies in southwest Alaska is thought to have occurred at the northern end of the Kodiak archipelago (Figure 4D), near Shuyak Island. In 1959, Kenyon (1969) counted 395 sea otters in the Shuyak Island area. Over the next 30 years, the sea otter population in the Kodiak archipelago grew in numbers, and its range expanded southward around Afognak and Kodiak Islands (Schneider 1976, Simon-Jackson *et al.* 1984, Simon-Jackson *et al.* 1985). DeGange *et al.* (1995) surveyed the Kodiak archipelago in 1989 and calculated an adjusted population estimate of 13,526 sea otters. In July and August 1994, we conducted an aerial survey using the methods of Bodkin and Udevitz (1999) and calculated an adjusted population estimate of 9,817, approximately 27 percent lower than the estimate for 1989 (Doroff *et al.* in prep.). Although both surveys corrected for animals not detected by observers, differences in survey methods led to questions about

the ability to compare results between the two surveys. In June 2001, we surveyed the Kodiak archipelago using the same observer, pilot, and methods as in 1994. The result was an adjusted population estimate of 5,893 sea otters for the archipelago in 2001 (Doroff *et al.* in prep.), which is a 40-percent decline in comparison to the 1994 estimate and a 56-percent decline from the 1989 estimate.

Kamishak Bay

Kamishak Bay is located on the west side of lower Cook Inlet, north of Cape Douglas (Figure 4D). In 1994, Kamishak Bay was included as part of a survey for marine birds and marine mammals in lower Cook Inlet (Agler *et al.* 1995). The unadjusted population estimate of 5,914 sea otters from the 1994 survey included sea otters from both the southwest Alaska and the southcentral Alaska stocks (*see* section on Distinct Vertebrate Population Segment, below), therefore an estimate for only the Kamishak Bay area is not available. In the summer of 2002, the U.S. Geological Survey (USGS), Biological Resources Division conducted an aerial survey of lower Cook Inlet and the Kenai Fiords area. This survey was designed, in part, to estimate sea otter abundance in Kamishak Bay. The method used was identical to that of the 2001 aerial survey of the Kodiak archipelago, which includes a correction factor for sea otters not detected by the observer (Bodkin and Udevitz 1999). Sea otters were relatively abundant within Kamishak Bay during the 2002 survey, with numerous large rafts of sea otters observed. The adjusted estimate for the current sea otter population size in Kamishak Bay is 6,918 (USGS in litt. 2002). As no previous estimates for Kamishak Bay exist, the population trend for this area is unknown.

Overall Comparison

The history of sea otters in southwest Alaska is one of commercial exploitation to near extinction (1742 to 1911), protection under the International Fur Seal Treaty (1911), and population recovery (post-1911). By the mid- to late-1980s, sea otters in southwest Alaska had grown in numbers and recolonized much of their former range. The surveys conducted in various areas, described above, provide information about the extent of declines within those areas. However, due to differences in the years of the various baseline surveys for different areas (1962, 1965, 1976, 1989), it is difficult to combine those surveys as a basis for estimating the overall size of the sea otter population throughout southwest Alaska at the onset of the decline. Therefore, as part of our effort to evaluate information reflecting the overall magnitude of the decline, we also have considered information provided by Calkins and Schneider (1985), who summarized sea otter population estimates worldwide based on data collected through 1976. Much of the information they present is from unpublished Alaska Department of Fish and Game survey results, and we include this information as it is the only comprehensive reference for estimating the overall magnitude of the sea otter decline in southwest Alaska.

Calkins and Schneider (1985) provided estimates as of 1976, adjusted for animals not detected by observers, for the Aleutian Islands (55,100–73,700), north Alaska Peninsula (11,700–17,200), south Alaska Peninsula (22,000–30,000) and Kodiak archipelago (4,000–6,000). They did not report a specific estimate for the Kamishak Bay area, which presumably was included within their estimate for the Kenai Peninsula and Cook Inlet area (2,500–3,500 otters), and we are assuming that half of the sea otters estimated for Kenai Peninsula and Cook Inlet occurred in Kamishak Bay (1,250–1,750). Combining these estimates, the sea otter population in the area encompassing the range of the southwest Alaska population was believed to have numbered between 94,050–128,650 animals as of 1976. As sea otters had not yet fully recolonized southwest Alaska or reached equilibrium density in all areas in 1976, additional population growth was expected. Therefore, the overall population prior to the onset of the decline in the 1980's probably was higher than the population estimate for 1976.

Our estimate for the current size of the southwest Alaska population of the northern sea otter is 41,474 animals (Table 2). This estimate is based on recent survey information, adjusted for animals not detected.

TABLE 2.—CURRENT POPULATION ESTIMATES FOR THE SEA OTTER IN SOUTHWEST ALASKA

[Alaska Peninsula and Unimak Island counts are adjusted using a correction factor of 2.38 for twin-engine aircraft surveys of sea otters according to Evans *et al.* (1997). Aleutian Islands, Kodiak Archipelago, and Kamishak Bay surveys are adjusted using survey-specific correction factors.]

Survey area	Year	Unadjusted count or estimate	Adjusted count or estimate	Reference
Aleutian Islands	2000	2,442	8,742	Doroff *et al.* (2003).
North Alaska Penninsula Offshore Areas	2000	4,728	11,253	Burn and Doroff (in prep.).
South Alaska Peninsula Offshore Areas	2001	1,005	2,392	Burn and Doroff (in prep.).
South Alaska Peninsula Shoreline	2001	[a]2,190	5,212	Burn and Doroff (in prep.).
South Alaska Peninsula Islands	2001	405	964	Burn and Doroff (in prep.).
Unimak Island	2001	42	100	Burn and Doroff (in prep.).
Kodiak Archipelago	2001	.....	5,893	Doroff *et al.* (in prep.).
Kamishak Bay	2002	.....	6,918	USGS Unpublished data.
Total	.....	.....	41,474	

[a] Does not include a count of 461 sea otters from False Pass to Seal Cape, which was also surveyed as part of the south Alaska Peninsula Offshore Areas survey.

The 1976 population estimate based on the work of Calkins and Schneider (1985) is not directly comparable to our current estimate because of somewhat different survey approaches and estimation techniques. Nevertheless, the results provide a basis for at least a rough comparison of the overall extent of the decline of sea otters in southwest Alaska. When compared to the estimate of 94,050–128,650 from Calkins and Schneider (1985), our current estimate of approximately 41,500 sea otters is 53,000–87,000 lower, which is 56–68 percent lower than the estimate for 1976.

Translocated Sea Otter Populations

As part of efforts to re-establish sea otters in portions of their historical range, otters from Amchitka Island (part of the Aleutian Islands) were translocated to other areas outside the range of what we now recognize as the southwest Alaska distinct population segment, but within the range of *E. l. kenyoni* (Jameson *et al.* 1982). These translocation efforts met with varying degrees of success. From 1965 to 1969, 412 otters (89 percent from Amchitka Island, and 11 percent from Prince William Sound, which is in southcentral Alaska, outside the range of the southwest Alaska DPS) were translocated to six sites in southeast Alaska (Jameson *et al.* 1982). Since that time, these translocated populations have grown rapidly in numbers and expanded their range. The most recent surveys conducted between 1994 and 1996 estimated 12,632 otters in southeast Alaska (USFWS 2002b).

Sea otters from Amchitka Island also were translocated to Washington and Oregon, and to British Columbia, Canada, between 1969 and 1972 (Jameson *et al.* 1982). Sea otters translocated to British Columbia were captured at Amchitka Island and Prince William Sound; the otters translocated to Washington and Oregon were captured at Amchitka Island only. The British Columbia and Washington populations have grown in number and expanded their range, while the Oregon population disappeared. The most recent estimates of population size are 550 in Washington and 2,000 in British Columbia (Jameson and Jeffries 2001; Watson *et al.* 1997). Although these populations, as well as sea otters in southeast Alaska, are descended from sea otters at Amchitka Island, they are geographically isolated from the southwest Alaska population and their parent population by hundreds of kilometers (see section entitled Distinct Vertebrate Population Segment, below) and are not included in this proposed listing action.

The total number of otters removed from Amchitka as part of this translocation program was just over 600 animals (Jameson *et al.* 1982). Estes (1990) estimated that the sea otter population at Amchitka Island remained essentially stable at more than 5,000 otters between 1972 and 1986, and consequently there is no evidence that removals for the translocation program have been a contributing factor in the current population decline.

Previous Federal Action

Based on the results of the April 2000 sea otter survey in the Aleutian Islands, we added sea otters in the Aleutians to our list of candidate species in August of 2000 (65 FR 67343). On October 25, 2000, we received a petition from the Center for Biological Diversity (Center) in Berkeley, California, requesting that we list the Aleutian population of the northern sea otter as endangered. As we already had identified sea otters in the Aleutians as a candidate species, we considered the petition to be a second, redundant petition, and in accordance with our petition management guidance (61 FR 36075) did not make an additional 90-day or 12-month finding on this petition. On November 14, 2000, we received a Notice of Intent to sue from the Center challenging our decision not to propose to list sea otters in the Aleutians under the Act. We responded to the Center that funds were not available during Fiscal Year 2001 to prepare a proposed listing rule.

On August 21, 2001, we received a petition from the Center to designate the Alaska stock of sea otters (State-wide) as depleted under the Marine Mammal Protection Act (MMPA; 16 U.S.C. 1361 *et seq.*). Under the MMPA, a marine mammal species or population stock is considered to be depleted when it is below its Optimum Sustainable Population (OSP) level. The OSP is defined in the MMPA as: "the number of animals which will result in the maximum productivity of the population or the species, keeping in mind the carrying capacity of the habitat and the health of the ecosystem of which they form a constituent element." In accordance with the MMPA, we published a notice in the **Federal Register** on September 6, 2001, announcing the receipt of this petition (66 FR 4661). On November 2, 2001, we published our finding on the petition in the **Federal Register** (66 FR 55693). While we acknowledged the evidence of a population decline in the southwest Alaska stock, the best available information suggested that the southeast Alaska stock was increasing, and the southcentral Alaska stock was either stable or increasing. We found that the petitioned action was not warranted under the MMPA for the following reasons: (1) The best estimate of the population size for the entire state of Alaska was greater than the value presented in the petition; (2) based on the best estimate of population size, the Alaska stock of sea otters was above OSP level; and (3) recent information had identified the existence of three stocks of sea otters in Alaska: southwest, southcentral, and southeast (Gorbics and Bodkin 2001). The boundaries of these three stocks are depicted in Figure 5.

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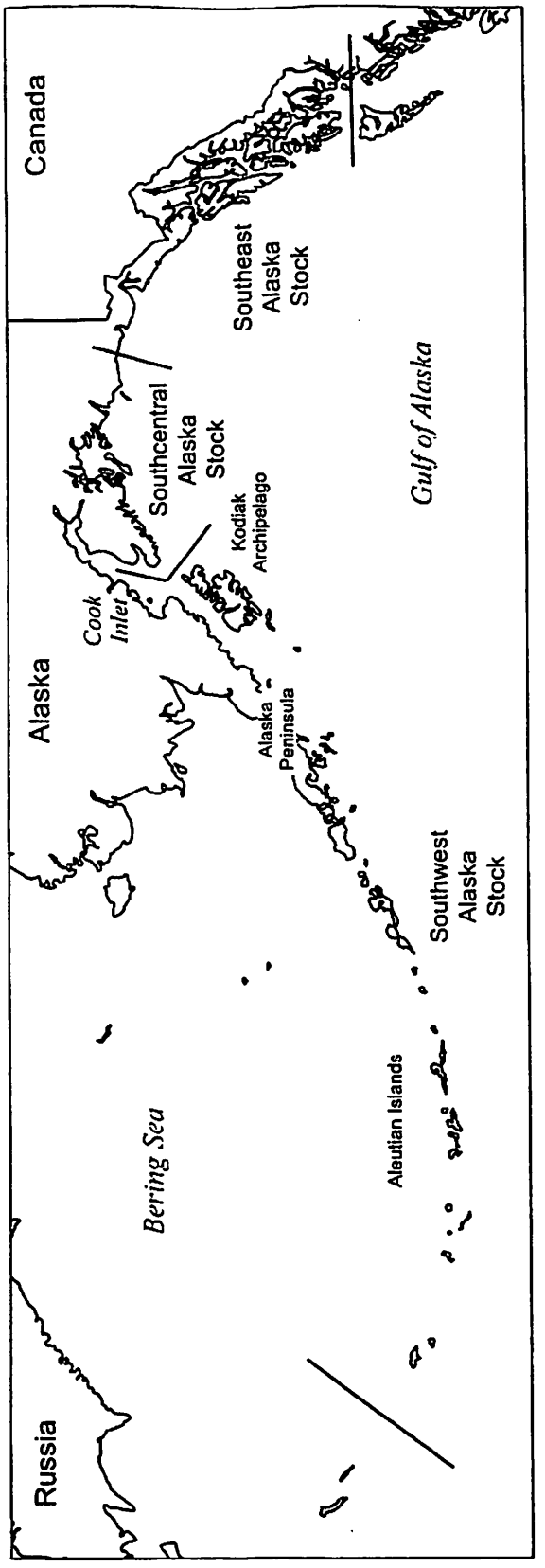

Figure 5. Northern sea otter stock boundaries in Alaska, from Gorbics and Bodkin (2001).

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We recently revised the MMPA stock assessment reports for sea otters in Alaska. Draft stock assessment reports identifying the three stocks of sea otters were made available for public review and comment from March 28 to June 26, 2002 (67 FR 14959). The sea otter stock assessment reports were finalized on August 20, 2002, and notice of their availability was published on October 9, 2002 (67 FR 62979).

On January 11, 2002, we received a petition from the Sea Otter Defense Initiative (SODI), a project of the Earth Island Institute, in Deer Isle, Maine. The petition requested that we emergency and permanently list the southwest Alaska stock of sea otters as endangered. We responded to SODI that, based on the best available population estimate that we prepared in response to the Center's petition to list the Alaska stock of sea otters as depleted under the MMPA, an emergency listing of the southwest Alaska stock was not warranted. We also notified SODI that we had begun the preparation of this proposed rule during Fiscal Year 2002.

Based on additional sea otter surveys along the Alaska Peninsula and Kodiak archipelago, and the identification of multiple stocks of sea otters in Alaska, we expanded the candidate species designation on June 3, 2002, to include the geographic range of the southwest Alaska stock of the northern sea otter. Notification of this change was included in our June 13, 2002, notice of review of candidate species (67 FR 40657).

Distinct Vertebrate Population Segment

Pursuant to the Act, we must consider for listing any species, subspecies, or, for vertebrates, any distinct population segment (DPS) of these taxa if there is sufficient information to indicate that such action may be warranted. To interpret and implement the DPS provision of the Act and Congressional guidance, the Service and the National Marine Fisheries Service published, on December 21, 1994, a draft Policy Regarding the Recognition of Distinct Vertebrate Population Segments Under the Endangered Species Act and invited public comments on it (59 FR 65885). After review of comments and further consideration, the Services adopted the interagency policy as issued in draft form, and published it in the **Federal Register** on February 7, 1996 (61 FR 4722). This policy addresses the recognition of DPSs for potential listing actions. The policy allows for more refined application of the Act that better reflects the biological needs of the taxon being considered, and avoids the inclusion of entities that do not require its protective measures.

Under our DPS policy, three elements are considered in a decision regarding the status of a possible DPS as endangered or threatened under the Act. These are applied similarly for additions to the list of endangered and threatened species, reclassification, and removal from the list. They are: (1) Discreteness of the population segment in relation to the remainder of the taxon; (2) the significance of the population segment to the taxon to which it belongs; and (3) the population segment's conservation status in relation to the Act's standards for listing (*i.e.*, is the population segment, when treated as if it were a species, endangered or threatened?). A systematic application of the above elements is appropriate, with discreteness criteria applied first, followed by significance analysis. Discreteness refers to the isolation of a population from other members of the species and we evaluate this based on specific criteria. We determine significance by using the available scientific information to determine the DPS's importance to the taxon to which it belongs. If we determine that a population segment is discrete and significant, we then evaluate it for endangered or threatened status based on the Act's standards.

Discreteness

Under our Policy Regarding the Recognition of Distinct Vertebrate Population Segments, a population segment of a vertebrate species may be considered discrete if it satisfies either one of the following conditions:

1. It is markedly separated from other populations of the same taxon as a consequence of physical, physiological, ecological, or behavioral factors. Quantitative measures of genetic or morphological discontinuity may provide evidence of this separation.
2. It is delimited by international governmental boundaries within which differences in control of exploitation, management of habitat, conservation status, or regulatory mechanisms exist that are significant in light of section 4(a)(1)(D) of the Act.

The focus of our DPS evaluation is the subspecies *E. l. kenyoni*, which occurs from the west end of the Aleutian Islands in Alaska, to the coast of the State of Washington (Wilson *et al.* 1991), as depicted in Figure 1. To the west of the Aleutian Islands, the sea otters in Russia are recognized as a separate subspecies, *E. l. lutris*. To the east of the Aleutians, a discontinuity in sea otter distribution occurs at Cook Inlet. This discontinuity also was specifically recognized during the process of identifying marine mammal stocks under the MMPA, and is reflected by the boundary separating the southwest Alaska stock of sea otters from the southcentral stock, as shown in Figure 4. Although sea otters inhabit both the eastern and western shores of lower Cook Inlet, their distribution around the Inlet is not contiguous because the presence of winter sea ice in upper Cook Inlet forms a natural break in sea otter distribution. This break in sea otter distribution in the upper portion of the Inlet persists throughout the ice-free portions of the year as well (Rotterman and Simon-Jackson 1988).

In the lower portion of Cook Inlet, a different type of barrier exists in the form of an expanse of deep water. The distance across lower Cook Inlet ranges from 50–90 km (31–56 miles). While sea otters are physically capable of swimming these distances, the water depths of up to 260 m (142 fathoms) and lack of food resources for sea otters in deep water areas makes such movements across this open water area quite unlikely.

Surveys conducted for sea otters and other species in the area of Lower Cook Inlet confirm the discontinuity of sea otters in this area. In the summer of 1993, Agler *et al.* (1995) conducted boat-based surveys of marine birds and mammals, including sea otters, in Lower Cook Inlet. During approximately 1,574 km (978 miles) of survey effort, only one sea otter was observed in the center of the Inlet. More recently, during an aerial survey of sea otters conducted in the summer of 2002, no otters were observed on 324 km (201 miles) of transects flown across the center of Cook Inlet (USGS in litt. 2002).

Information gathered incidental to surveys of other species also indicates that sea otters rarely occur in the offshore areas of lower Cook Inlet, further confirming the discontinuity of sea otters in this area. NMFS has conducted aerial surveys of beluga whales, *Delphinapterus leucas*, in Cook Inlet since 1993. In addition to beluga whales, observers recorded observations of other marine mammals, including sea otters. During these surveys, which covered a combined total of 11,583 km (7,197 miles) of systematic transects flown across the inlet over several years, no sea otters were observed in the deeper, offshore areas of Cook Inlet (Rugh *et al.* 2000). The NMFS also conducted a marine mammal observer program during the Cook Inlet salmon drift and set gillnet fisheries in 1999 and 2000 (Fadely and Merklein 2001). During this period with several thousand hours of observations, no sea otters were recorded in the offshore

areas of Cook Inlet. Given the amount of survey effort that has been expended, the almost complete lack of observations in deeper offshore waters indicates that there is little exchange of sea otters between the eastern and western shores of lower Cook Inlet.

The population of sea otters represented by the southwest Alaska stock is genetically different from both the southcentral and southeast Alaska stocks. Studies using mitochondrial DNA analysis identified ten different genotypes within the range of sea otters; six of these ten different genotypes are found in Alaska (Sanchez 1992, Bodkin *et al.* 1992, Cronin *et al.* 1996). Gorbics and Bodkin (2001) demonstrated that mitochondrial DNA haplotype frequencies (a descriptive genetic characteristic) differ significantly among sea otters from southwest Alaska (west of Cook Inlet) compared to those from southcentral Alaska (east of Cook Inlet) and southeast Alaska.

Additional genetic analysis of both mitochondrial and nuclear (microsatellite) DNA (these are two different approaches for examining genetic diversity) has shown similar patterns of genetic differentiation and supports the identification of multiple populations of sea otters in Alaska. As mitochondrial DNA is maternally inherited, it can only be used to assess gene flow in females. Analysis of nuclear genetic markers, such as microsatellite DNA, can be used to assess gene flow by both males and females and provide a better quantification of genetic differentiation than mitochondrial DNA alone (Cronin *et al.* 2002). Pairwise comparisons of both mitochondrial and nuclear DNA between individual sampling locations from southwest and southcentral Alaska had 40 significant differences out of 60 comparisons (67%). In addition, tests of heterogeneity between pooled sampling locations showed significant differences between sea otters in southwest and southcentral Alaska in three out of three tests (Cronin *et al.* 2002). These genetic differences are most likely the result of little or no movement of animals across stock boundaries (Gorbics and Bodkin 2001). The boundary between the southwest and southcentral stocks of sea otters is in the area of Cook Inlet, and the aforementioned genetic differences and lack of observations from the center of Cook Inlet indicate that sea ice and deep water constitute physical barriers that effectively limit animal movements between the southwest and southcentral Alaska stocks of sea otters.

Sea otters in southwest and southcentral Alaska also differ morphologically. Comparison of 10 skull characteristics between 26 adult sea otters from Amchitka Island and 42 sea otters from Prince William Sound showed numerous statistically significant differences, with the Amchitka otters being the larger of the two (Gorbics and Bodkin 2001).

These genetic and morphological differences were part of the basis for identification of sea otter population stocks under the MMPA (USFWS 2002a, USFWS 2002b, USFWS 2002c). The Service and NMFS have adopted the methods of Dizon *et al.* (1992), who outlined four criteria for consideration when identifying marine mammal population stocks: (1) Distribution; (2) population response; (3) morphology; and (4) genetics. Applying these criteria to the best available scientific information, Gorbics and Bodkin (2001) identified three stocks of sea otters in Alaska, the southwest, southcentral, and southeast stocks, with ranges as depicted in Figure 5.

In summary, sea otters from the Aleutians Islands to the middle of Cook Inlet are a population that differs from other sea otters in several respects. Sea otters to the west of the Aleutians are recognized as belonging to a different taxon, the subspecies *E. l. lutris*. Within the taxon *E. l. kenyoni*, there are physical barriers to movement across the upper and the lower portions of Cook Inlet, and there are morphological and genetic differences between sea otters that correspond to the southwest and southcentral Alaska stocks that we identified under the MMPA, with Cook Inlet being the boundary separating these stocks. The geographic separation between the southwest and southeast Alaska stocks is even greater than between the southwest and southcentral Alaska stocks. In addition, Bodkin *et al.* (1999) note that haplotype frequencies in southeast Alaska (a translocated population) differed significantly from both "parent" stocks.

Based on our consideration of the best scientific information available, we find that the southwest Alaska population of the northern sea otter that occurs from the Aleutian Islands to Cook Inlet, corresponding to the southwest Alaska stock as identified by us previously under the MMPA (Figure 5), is markedly separated from other populations of the same taxon as a consequence of physical factors, and there is genetic and morphological discontinuity that is evidence of this separation. Therefore, the southwest Alaska population of the northern sea otter meets the criterion of discreteness under our Policy Regarding the Recognition of Distinct Vertebrate Population Segments.

Significance

If we determine a population segment is discrete, we next consider available scientific evidence of its significance to the taxon to which it belongs. Our policy states that this consideration may include, but is not limited to, the following:

1. Persistence of the discrete population segment in an ecological setting unusual or unique for the taxon,
2. Evidence that loss of the discrete population segment would result in a significant gap in the range of the taxon,
3. Evidence that the discrete population segment represents the only surviving natural occurrence of a taxon that may be more abundant elsewhere as an introduced population outside its historic range, or
4. Evidence that the discrete population segment differs markedly from other populations of the species in its genetic characteristics.

The sea otter population that corresponds to the southwest Alaska stock contains over 60 percent of the range for the subspecies *E. l. kenyoni*. Following protection from commercial exploitation in 1911, sea otters recovered quickly in southwest Alaska, which is a remote part of the State. In the mid-1980s, biologists believed that 94 percent of the subspecies *E. l. kenyoni*, and 84 percent of the world population, existed in southwest Alaska (Calkins and Schneider 1985). Despite the recent population decline, current information indicates that roughly half of all sea otters in the subspecies *E. l. kenyoni* exist in the southwest Alaska population. Thus, the loss of this population segment would result in a significant gap in the range of the taxon because it comprises 60 percent of the range and approximately half of the population of the subspecies. In addition, the best scientific information available demonstrates the southwest Alaska population differs significantly from the southcentral and southeast Alaska stocks in terms of genetic characteristics (Gorbics and Bodkin 2001). Therefore, we find that the southwest Alaska population segment is significant to the taxon to which it belongs because the loss of this segment would result in a significant gap in the range of the taxon, and because there is evidence that it differs markedly from other populations of the taxon in its genetic characteristics.

Summary of Discreteness and Significance Evaluations

Based on the above consideration of the southwest Alaska population of the northern sea otter's discreteness and its

significance to the remainder of the taxon, we find that it is a distinct population segment, or DPS, as described under our Policy Regarding the Recognition of Distinct Vertebrate Population Segments. The population's discreteness is due to its separation from other populations of the same taxon as a consequence of physical factors, and there are morphological and genetic differences from the remainder of the taxon that are evidence of this separation. The population segment's significance to the remainder of the taxon is due principally to the significant gap that its loss would represent in the range of the taxon, and also to the fact that it differs markedly from other populations of the species in its genetic characteristics. We refer to this population segment as the southwest Alaska DPS for the remainder of this proposed rule.

Conservation Status

Pursuant to the Act, we must consider for listing any species, subspecies, or, for vertebrates, any distinct population segment of these taxa, if there is sufficient information to indicate that such action may be warranted. We have evaluated the conservation status of the southwest Alaska DPS of the northern sea otter in order to make a determination relative to whether it meets the Act's standards for listing the DPS as endangered or threatened. Based on the definitions provided in section 3 of the Act, endangered means the DPS is in danger of extinction throughout all or a significant portion of its range, and threatened means the DPS is likely to become endangered within the foreseeable future throughout all or a significant portion of its range.

Summary of Factors Affecting the Species

Section 4 of the Act and regulations (50 CFR part 424) promulgated to implement the listing provisions of the Act set forth the procedures for adding species to the Federal list. As defined in section 3 of the Act, the term "species" includes any subspecies of fish or wildlife or plants, and any distinct population segment of any species or vertebrate fish or wildlife which interbreeds when mature. We may determine a species to be an endangered or threatened species due to one or more of the five factors described in section 4(a)(1) of the Act. These factors, and their application to the southwest Alaska DPS of the northern sea otter, are as follows:

A. The Present or Threatened Destruction, Modification, or Curtailment of Its Habitat or Range

Habitat destruction or modification are not known to be major factors in the decline of the southwest Alaska DPS of the northern sea otter. At present, no curtailment of range has occurred, as sea otters still persist throughout the range of the DPS, albeit at markedly reduced densities. However, as there is no evidence to suggest that the decline has abated, it is possible that additional losses may occur that would curtail the range of sea otters in southwest Alaska.

Human-induced habitat effects occur primarily in the form of removal of some of the prey species used by sea otters as a result of resource use such as commercial fishing, which occurs throughout southwest Alaska. While there are some fisheries for benthic invertebrates in southwest Alaska, there is little competition for prey resources due to the limited overlap between the geographic distribution of sea otters and fishing effort. In addition, the total commercial catch of prey species used by sea otters is relatively small (Funk 2003).

In studies of sea otters in the Aleutians, there was no evidence that sea otters are nutritionally stressed in that area, and foraging behavior, measured as percent feeding success, has increased during the 1990's (Estes *et al.* 1998).

Development of harbors and channels by dredging may affect sea otter habitat on a local scale by disturbing the sea floor and benthic invertebrates that sea otters eat. Typically, the number and size of these activities are small relative to the overall range of the DPS.

B. Overutilization for Commercial, Recreational, Scientific, or Educational Purposes

Following 170 years of commercial exploitation, sea otters were protected in 1911 under the International Fur Sea Treaty, which prohibited further hunting. In 1972, the Marine Mammal Protection Act (MMPA) established a moratorium on the take of all marine mammals in U.S. waters. Section 101(b) of the MMPA provides an exemption for Alaska Natives to take marine mammals for subsistence purposes. Although the Native exemption was established in 1972, subsistence harvest of sea otters did not begin in earnest until the mid-1980s (Simon-Jackson 1988). In October 1988, we initiated the marine mammal Marking, Tagging, and Reporting Program (MTRP) to monitor the harvest of sea otter, polar bear (*Ursus maritimus*), and Pacific walrus (*Odobenus rosmarus divergens*) in Alaska (50 CFR 18.23(f)). The majority of the sea otter harvest occurs in southeast and southcentral Alaska. Information from the MTRP estimates the subsistence harvest of sea otters from the southwest Alaska DPS averaged less than 100 sea otters per year during the 1990s (Burn and Doroff in prep.). Based on the magnitude of the current decline, the impact of the subsistence harvest is negligible.

Scientific research on sea otters occurs primarily as aerial and skiff surveys of abundance, and such surveys are conducted infrequently (once every few years) and when they occur, they last for very short durations of time. During the 1990s, 198 otters were captured and released as part of health monitoring and radio telemetry studies at Adak and Amchitka (T. Tinker, University of California at Santa Cruz, *in litt.* 2003). Based on the magnitude of the current decline, we do not believe that the impact of surveys, or the impact of capture/release activities, is a significant factor.

Translocations of sea otters from southwest Alaska to other areas also has occurred. These translocations took place from 1965 to 1972, and involved removal of a total of just over 600 sea otters from Amchitka Island (Jameson *et al.* 1982). Estes (1990) estimated that the sea otter population at Amchitka Island remained essentially stable at more than 5,000 otters between 1972 and 1986, and consequently there is no evidence that removals for the translocation program have resulted in overutilization.

C. Disease or Predation

Fish processing operations produce large quantities of organic waste, which can affect the health of sea otters on a local scale. In some areas of Alaska, sea otters have been observed consuming fish waste. Necropsies of carcasses recovered in Orca Inlet, Prince William Sound (which is not within the range of the southwest Alaska DPS), revealed that some otters in these areas had developed parasitic infections and fish bone impactions that contributed to the deaths of these animals (Ballachey *et al.* 2002, King *et al.* 2000). Measures such as heating and grinding waste materials, or barging it further offshore, have proven successful at eliminating these impacts. There is no evidence that the fish processing operations are resulting in disease on any substantial scope or scale for the southwest Alaska DPS of the northern sea otter.

The cause of the sea otter decline in the Aleutians has been explored by reviewing available data on sea otter

reproduction, survival, distribution, habitat, and environmental contaminants. Estes *et al.* (1998) concluded that the observed sea otter declines there were most likely the result of increased adult mortality. While disease, pollution, and starvation may all influence sea otter mortality, no evidence available at this time suggests these factors are contributing to the decline in the Aleutians.

The weight of evidence of available information suggests that predation by killer whales (*Orcinus orca*) may be the most likely cause of the sea otter decline in the Aleutian Islands (Estes *et al.* 1998). Data that support this hypothesis include: (1) A significant increase in the number of killer whale attacks on sea otters during the 1990s (Hatfield *et al.* 1998); (2) scarcity of beachcast otter carcasses that would be expected if disease or starvation were occurring; and (3) markedly lower mortality rates between sea otters in a sheltered lagoon (where killer whales cannot go) as compared to an adjacent exposed bay. Similar detailed studies have not yet been conducted in other areas within the southwest Alaska DPS, and the role of killer whale predation on sea otters outside of the Aleutians is unknown. (*See* the discussion of Factor E, below, for additional information concerning killer whales.)

Besides killer whales, other predators on sea otters include white sharks (*Carcharodon carcharias*), brown bears (*Ursus arctos*), and coyotes (*Canis latrans*) (Riedman and Estes 1990). Carcasses of sea otter pups have been observed in bald eagle (*Haliaeetus leucocephalus*) nests (Sherrod *et al.* 1975). Although there is anecdotal information regarding shark attacks on sea otters in Alaska, we believe that the impact of sharks and predators other than killer whales on the southwest Alaska DPS of the northern sea otter is negligible.

D. The Inadequacy of Existing Regulatory Mechanisms

The MMPA (16 U.S.C. 1361), enacted in 1972, is an existing regulatory mechanism that involves sea otters. The MMPA placed a moratorium on the taking of marine mammals in U.S. waters. Similar to the definition of "take" under section 3 of the ESA, "take" is defined under the MMPA as "harass, hunt, capture, or kill, or attempt to harass, hunt, capture or kill" (16 U.S.C. 1362). The MMPA does not include provisions for restoration of depleted species or population stocks, and does not provide measures for habitat protection.

Section 101(b) of the MMPA provides an exemption to allow Alaska Natives to take marine mammals for subsistence purposes. The MMPA does not allow any regulation of the subsistence harvest prior to a finding of depletion. By definition, a marine mammal species or stock that is designated as "threatened" or "endangered" under the Endangered Species Act is also classified as "depleted" under the MMPA. The converse is not true, however, as a marine mammal species or stock may be designated as depleted under the MMPA, but not be listed as threatened under the ESA. As stated earlier, current levels of subsistence harvest of sea otters, which amounted to fewer than 100 sea otters per year during the 1990s, are believed to have a negligible impact on this DPS, and is therefore not a cause for concern at this time.

Section 118 of the MMPA addresses the taking of marine mammals incidental to commercial fishing operations. This section, which was added to the MMPA in 1994, establishes a framework that authorizes the incidental take of marine mammals during commercial fishing activities. In addition, this section outlines mechanisms to monitor and reduce the level of incidental take. Information from monitoring programs administered by NMFS indicates that interactions between sea otters and commercial fisheries result in less than one instance of mortality or serious injury per year within the southwest Alaska DPS and are, therefore, not a cause for concern at this time (USFWS 2002a).

Northern sea otters are not on the State of Alaska lists of endangered species or species of special concern. Alaska Statutes sections 46.04 200–210 specify State requirements for Oil and Hazardous Substance Discharge and Prevention Contingency Plans. These sections include prohibitions against oil spills and provide for the development of contingency plans to respond to spills should they occur. The potential impacts of oil spills on sea otters are addressed in Factor E.

E. Other Natural or Manmade Factors Affecting Its Continued Existence

Sea otters are particularly vulnerable to contamination by oil (Costa and Kooyman 1981). As they rely solely on fur for insulation, frequent grooming is essential to maintain the insulative properties of the fur. Vigorous grooming bouts generally occur before and after feeding episodes and rest periods. Oiled sea otters are highly susceptible to hypothermia resulting from the reduced insulative properties of oil-matted fur. Contaminated sea otters also are susceptible to the toxic effects from oil ingested while grooming. In addition, volatile hydrocarbons may affect the eyes and lung tissues of sea otters in oil-contaminated habitats and contribute to mortality.

The sea otter's vulnerability to oil was clearly demonstrated during the *Exxon Valdez* oil spill in 1989, when thousands of sea otters were killed in Prince William Sound, Kenai Fiords, the Kodiak archipelago, and the Alaska Peninsula. Although the spill occurred hundreds of miles outside the range of the southwest Alaska DPS of the northern sea otter, an estimated 905 sea otters from this population segment died as a result of the spill (Handler 1990, Doroff *et al.* 1993, DeGange *et al.* 1994).

Although numerous safeguards have been established since the *Exxon Valdez* oil spill to minimize the likelihood of another spill of catastrophic proportions in Prince William Sound, vessels and fuel barges are a potential source of oil spills that could impact sea otters in southwest Alaska. Since 1990 in Alaska, more than 4,000 spills of oil and chemicals on water have been reported to the U.S. Coast Guard National Response Center. Of these, nearly 1,100 occurred within the range of the southwest Alaska DPS of the northern sea otter. Reported spills include a variety of quantities (from a few gallons to thousands of gallons) and materials (primarily diesel fuel, gasoline, and lubricating oils). Reports of direct mortality of sea otters as a result of these spills are lacking and the impact of chronic oiling on sea otters in general, or on the southwest Alaska DPS, is unknown. Also, despite the fact that locations such as boat harbors have higher occurrences of small spills than more remote areas, individual sea otters have been observed to frequent some harbors for years. The overall health, survivorship, and reproductive success of these otters is not known.

Currently, there is no oil and gas production within the range of the southwest Alaska DPS of the northern sea otter. Proposed Outer Continental Shelf (OCS) oil and gas lease sales are planned, however, for lower Cook Inlet. Based on a review of the draft Environmental Impact Statement for these lease sales, it is our opinion that the potential impacts of this development on the southwest Alaska DPS will be negligible as sea otters occur primarily in the nearshore zone and the lease sale area is at least three miles off shore. Therefore, sea otters do not significantly overlap with the lease sale area.

Contaminants may also affect sea otters and their habitat. Potential sources of contaminants include local sources at specific sites in Alaska, and remote sources outside of Alaska. One category of contaminants that has been studied are polychlorinated biphenyls (PCBs), which may originate from a wide variety of sources. Data from blue mussels collected from the Aleutian Islands in southwest Alaska through southeast Alaska indicate background concentrations of PCBs at most sampling locations, with "hot spots" of high PCB concentrations evident at Adak (Sweeper Cove), Dutch Harbor, and Amchitka. Notwithstanding these "hot spots," PCB levels in samples from southwest Alaska actually are lower than those in southeast Alaska sites. The PCB concentrations found in liver tissues of sea otters from the Aleutians were similar to or higher than those causing reproductive failure in captive mink (Estes *et al.* 1997, Giger and Trust 1997), but the toxicity of PCBs to sea otters is unknown. Population survey data for the Adak Island area indicates normal ratios of mothers and pups, which suggests that reproduction in sea otters is not being suppressed in sea otters in that area (Tinker and Estes 1996). As PCB's typically inhibit reproduction rather than cause adult mortality, these findings do not suggest a reproductive impact due to PCBs. Sample sizes were limited, however, and data needed to fully evaluate the potential role of PCBs and other environmental contaminants in the observed sea otter population decline are incomplete. In summary, a conclusive link between the sea otter decline and the effects of specific contaminants in their habitat has not been established.

Sea otters are sometimes taken incidentally in commercial fishing operations. Information from the NMFS list of fisheries indicates that entanglement leading to injury or death occurs infrequently in set net, trawl, and finfish pot fisheries within the range of the southwest Alaska DPS of the northern sea otter (67 FR 2410, January 17, 2002). During the summers of 1999 and 2000, NMFS conducted a marine mammal observer program in Cook Inlet for salmon drift and set net fisheries. No mortality or serious injury of sea otters was observed in either of these fisheries in Cook Inlet (Fadely and Merklein 2001). Similarly, preliminary results from an ongoing observer program for the Kodiak salmon set net fishery also report only four incidents of entanglement of sea otters, with no mortality or serious injury (M. Sternfeld, NMFS, in litt. 2003). Additional marine mammal observer programs will continue to improve our understanding of this potential source of sea otter mortality.

The hypothesis that killer whales may be the principal cause of the sea otter decline suggests that there may have been significant changes in the Bering Sea ecosystem (Estes *et al.* 1998). For the past several decades, harbor seals (*Phoca vitulina*) and Steller sea lions (*Eumetopias jubatus*), the preferred prey species of transient, marine mammal-eating killer whales, have been in decline throughout the western north Pacific. In 1990, Steller sea lions were listed under the Act as threatened under the ESA (55 FR 49204). Their designation was later revised to endangered in western Alaska, and threatened in eastern Alaska, with the dividing line located at 144 degrees west longitude (62 FR 24345). Estes *et al.* (1998) hypothesized that killer whales may have responded to declines in their preferred prey species, harbor seals and Stellar sea lions, by broadening their prey base to include sea otters. While the cause of sea lion and harbor seal declines is the subject of much debate, it is possible that changes in composition and abundance of forage fish as a result of climatic changes and/or commercial fishing practices may be contributing factors.

It also recently has been hypothesized that the substantial reduction of large whales from the North Pacific Ocean as a result of post-World War II industrial whaling may be the ultimate cause of the decline of several species of marine mammals in the north Pacific (Springer *et al.* 2003). Killer whales are considered to be the foremost natural predator of large whales. By the early 1970's, the biomass of large whales had been reduced by 95 percent, a result attributed to commercial harvesting. This reduction may have caused killer whales to begin feeding more intensively on smaller coastal marine mammals such as sea lions and harbor seals. As those species became increasing rare, the killer whales that preyed on them may have expanded their diet to include the even smaller and calorically less profitable, sea otter. The information supporting this theory is still under review. Although the proximate cause of the current sea otter decline may be predation by killer whales, the ultimate cause remains unknown.

Conclusion of Status Evaluation

We have carefully assessed the best scientific and commercial information available regarding the past, present, and future threats faced by the southwest Alaska DPS of the northern sea otter in determining to propose this rule. The Act defines an endangered species as one that is in danger of extinction throughout all or a significant portion of its range. A threatened species is one that is likely to become an endangered species in the foreseeable future throughout all or a significant portion of its range.

To date, investigations of the cause(s) of the sea otter decline have been limited to the Aleutian islands; little research has been conducted in other portions of the southwest Alaska DPS. Although killer whale predation has been hypothesized to be responsible for the sea otter decline in the Aleutian islands, the cause(s) of the decline throughout southwest Alaska are not definitively known.

At present, sea otters have not been extirpated from any portion of the range of the southwest Alaska DPS, however they have been reduced to markedly lower densities, particularly in the Aleutian Islands and south Alaska Peninsula areas. Recent survey information indicates that the southwest Alaska DPS has declined by at least 56–68 percent during the past 10–15 years. Estimated rates of decline have been as great as 17.5 percent per year in the Aleutian archipelago (Doroff *et al.* 2003). At present, we have no evidence to indicate that the decline has abated, and we have no reason to expect that the decline will cease. If the trend were to continue at the overall estimated decline rates for the southwest Alaska DPS, which range from 5.2–10.6 percent per year, the DPS would be further reduced from its current level by 66–89 percent in 20 years, and could become extirpated in portions of its range.

Regardless of its cause, the severity and widespread nature of the decline in the southwest Alaska sea otter DPS is quite serious. The decline may be due to predation by killer whales, which in turn may be the result of changes in the ecosystem. Also, regardless of what the reason for the decline may be, at present we have no evidence to indicate that the decline has abated, and we have no reason to expect that the decline will cease. Given the current population size and distribution, we do not believe the DPS is presently in danger of extinction throughout all or a significant portion of its range. Based on our evaluation of the best available scientific information, however, we believe it is likely to become an endangered species in the foreseeable future throughout all or a significant portion of its range. Therefore, we are proposing to list the

southwest Alaska DPS of the northern sea otter as threatened.

Critical Habitat

Critical habitat is defined in section 3 of the Act as: (i) The specific areas within the geographical area occupied by a species, at the time it is listed in accordance with the Act, on which are found those physical or biological features (I) essential to the conservation of the species and (II) that may require special management considerations or protection; and (ii) specific areas outside the geographical area occupied by a species at the time it is listed, upon a determination that such areas are essential for the conservation of the species. "Conservation" is defined in section 3 as meaning the use of all methods and procedures needed to bring the species to the point at which listing under the Act is no longer necessary.

The primary regulatory effect of critical habitat is the section 7(a)(2) requirement that Federal agencies shall insure that any action they authorize, fund, or carry out is not likely to result in the destruction or adverse modification of designated critical habitat.

Section 4(a)(3) of the Act and implementing regulations (50 CFR 424.12) require that, to the maximum extent prudent and determinable, we designate critical habitat at the time a species is determined to be endangered or threatened. Our regulations (50 CFR 424.12(a)(1)) state that designation of critical habitat is not prudent when one or both of the following situations exist—(1) the species is threatened by taking or other activity and the identification of critical habitat can be expected to increase the degree of threat to the species, or (2) such designation of critical habitat would not be beneficial to the species. Our regulations (50 CFR 424.12(a)(2)) further state that critical habitat is not determinable when one or both of the following situations exist: (1) Information sufficient to perform required analysis of the impacts of the designation is lacking, or (2) the biological needs of the species are not sufficiently well known to permit identification of an area as critical habitat.

Delineation of critical habitat requires identification of the physical and biological habitat features that are essential to the conservation of the species. In general terms, critical habitat for the southwest Alaska DPS of the northern sea otter may be a function of several factors, including: (1) Water depth; (2) proximity to shore; and (3) sheltered areas that provide refuge from rough weather and/or aquatic predators. Unlike other marine mammal species such as seals and sea lions, sea otters do not occur at high-density focal areas such as rookeries and haulout sites. Although they are occasionally observed on land, sea otters are typically distributed at low densities throughout shallow, nearshore marine waters. In addition to nearshore foraging areas, sea otters may move from exposed, open-water areas, into protected bays, lagoons, and inlets when inclement weather produces large waves. These sheltered areas may be important resting areas for sea otters, especially mothers with dependent pups. In addition, some sheltered areas may provide refuge from aquatic predators, such as killer whales and sharks.

With respect to whether it is prudent to designate critical habitat for the southwest Alaska DPS of the northern sea otter at the time of listing, such a designation would not be expected to increase the threat to the DPS. However, information sufficient to perform the required analysis of the impacts of the designation of critical habitat is lacking at this time. Further, at this time the identification of specific physical and biological features and specific areas for consideration as critical habitat is complicated by uncertainty as to the extent to which habitat may or may not be a limiting factor for this DPS, resulting in uncertainty as to which specific areas might be essential to the conservation of the species and thus meet a key aspect of the definition of critical habitat. Consequently, the designation of critical habitat for the southwest DPS of the northern sea otter is not determinable at this time. In the Public Comments Solicited section of this proposed rule we specifically request information regarding critical habitat. If the listing of the DPS becomes final, we then will consider whether to propose the designation of critical habitat.

Available Conservation Measures

Conservation measures provided to species listed as endangered or threatened under the Act include recognition, recovery actions, requirements for Federal protection, and prohibitions against certain activities. Recognition through listing results in public awareness and conservation actions by Federal, State, and local agencies, private organizations, and individuals. The Act provides for possible land acquisition and cooperation with the States and requires that recovery actions be carried out for all listed species. The protection required of Federal agencies and the prohibitions against taking and harm are discussed below.

Section 7(a) of the Act, as amended, requires Federal agencies to evaluate their actions with respect to any species that is listed as endangered or threatened and with respect to its critical habitat, if any is designated. Regulations implementing this interagency cooperation provision of the Act are codified at 50 CFR part 402. Section 7(a)(4) requires Federal agencies to confer informally with us on any action that is likely to jeopardize the continued existence of a species proposed for listing or result in destruction or adverse modification of proposed critical habitat. If a species is subsequently listed, section 7(a)(2) requires Federal agencies to ensure that activities they authorize, fund, or carry out are not likely to jeopardize the continued existence of the species or destroy or adversely modify its critical habitat. If a Federal action may affect a listed species or its critical habitat, the responsible Federal agency must enter into formal consultation with us under the provisions of section 7(a)(2) of the Act.

Several Federal agencies are expected to have involvement under section 7 of the Act regarding the southwest Alaska DPS of the northern sea otter. The National Marine Fisheries Service may become involved through their permitting authority for crab and ground fisheries. The Environmental Protection Agency may become involved through their permitting authority for the Clean Water Act. The U.S. Corps of Engineers may become involved through its responsibilities and permitting authority under section 404 of the Clean Water Act and through future development of harbor projects. Minerals Management Service may become involved through administering their programs directed toward offshore oil and gas development. The Denali Commission may be involved through their potential funding of fueling and power generation projects. The U.S. Coast Guard may become involved through their development of docking facilities.

The listing of the southwest Alaska DPS of the northern sea otter would subsequently lead to the development of a recovery plan for this species. Such a plan will bring together Federal, State, local agency, and private efforts for the conservation of this species. A recovery plan establishes a framework for interested parties to coordinate activities and to cooperate with each other in conservation efforts. The plan will set recovery priorities, identify responsibilities, and estimate the costs of the tasks necessary to accomplish the

priorities. It will also describe site-specific management actions necessary to achieve the conservation of the southwest Alaska DPS of the northern sea otter. Additionally, pursuant to Section 6 of the Act, we would be able to grant funds to the State of Alaska for management actions promoting the conservation of the southwest Alaska DPS of the northern sea otter.

Section 9 of the Act prohibits take of endangered wildlife. The Act defines take to mean harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or to attempt to engage in any such conduct. However, the Act also provides for the authorization of take and exceptions to the take prohibitions. Take of listed species by non-Federal property owners can be permitted through the process set forth in section 10 of the Act. For federally funded or permitted activities, take of listed species may be allowed through the consultation process of section 7 of the Act. The Service has issued regulations (50 CFR 17.31) that generally apply to threatened wildlife the prohibitions that section 9 of the Act establishes with respect to endangered wildlife. Our regulations for threatened wildlife also provide that a "special rule" under section 4(d) of the Act can be tailored for a particular threatened species. In that case, the general regulations for some section 9 prohibitions do not apply to that species, and the special rule contains the prohibitions, and exemptions, necessary and appropriate to conserve that species. The Act provides for an exemption for Alaska Natives in section 10(e) that allows any Indian, Aleut, or Eskimo who is an Alaskan Native who resides in Alaska to take a threatened or endangered species if such taking is primarily for subsistence purposes. Non-edible by-products of species taken pursuant to section 10(e) may be sold in interstate commerce when made into authentic native articles of handicrafts and clothing. It is also illegal to possess, sell, deliver, carry, transport, or ship any such wildlife that has been taken illegally. Further, it is illegal for any person to commit, to solicit another person to commit, or cause to be committed, any of these acts. Certain exceptions to the prohibitions apply to our agents and State conservation agencies.

The Act provides for the issuance of permits to carry out otherwise prohibited activities involving threatened or endangered wildlife under certain circumstances. Regulations governing permits are codified at 50 CFR 17.22 and 17.23. Such permits are available for scientific purposes, to enhance the propagation or survival of the species, and/or for incidental take in the course of otherwise lawful activities. Permits are also available for zoological exhibitions, educational purposes, or special purposes consistent with the purposes of the Act. Requests for copies of the regulations on listed species and inquiries about prohibitions and permits may be addressed to the Endangered Species Coordinator, U.S. Fish and Wildlife Service, 1011 East Tudor Road, Anchorage, Alaska 99503.

It is our policy, published in the **Federal Register** on July 1, 1994 (59 FR 34272), to identify, to the maximum extent practicable at the time a species is listed, those activities that would or would not likely constitute a violation of section 9 of the Act. The intent of this policy is to increase public awareness of the effects of the listing on proposed and ongoing activities within a species' range.

For the southwest DPS of the northern sea otter, we believe that, based on the best available information, the following activities are unlikely to result in a violation of section 9, provided these activities are carried out in accordance with existing regulations and permit requirements:

(1) Possession, delivery, or movement, including interstate transport of authentic native articles of handicrafts and clothing made from northern sea otters that were collected prior to the date of publication in the **Federal Register** of a final regulation adding the southwest Alaska DPS of the northern sea otter to the list of threatened species;

(2) Sale, possession, delivery, or movement, including interstate transport of authentic native articles of handicrafts and clothing made from sea otters from the southwest Alaska DPS that were taken and produced in accordance with section 10(e) of the Act;

(3) Any action authorized, funded, or carried out by a Federal agency that may affect the southwest Alaska DPS of the northern sea otter, when the action is conducted in accordance with an incidental take statement issued by us under section 7 of the Act;

(4) Any action carried out for the scientific research or to enhance the propagation or survival of the southwest Alaska DPS of the northern sea otter that is conducted in accordance with the conditions of a section 10(a)(1)(A) permit; and

(5) Any incidental take of the southwest Alaska DPS of the northern sea otter resulting from an otherwise lawful activity conducted in accordance with the conditions of an incidental take permit issued under section 10(a)(1)(B) of the Act. Non-Federal applicants may design a habitat conservation plan (HCP) for the species and apply for an incidental take permit. HCPs may be developed for listed species and are designed to minimize and mitigate impacts to the species to the greatest extent practicable.

We believe the following activities could potentially result in a violation of section 9 and associated regulations at 50 CFR 17.3 with regard to the southwest DPS of the northern sea otter; however, possible violations are not limited to these actions alone:

(1) Unauthorized killing, collecting, handling, or harassing of individual sea otters;

(2) Possessing, selling, transporting, or shipping illegally taken sea otters or their pelts;

(3) Unauthorized destruction or alteration of the nearshore marine benthos that actually kills or injures individuals sea otters by significantly impairing their essential behavioral patterns, including breeding, feeding or sheltering; and,

(4) Discharge or dumping of toxic chemicals, silt, or other pollutants (*i.e.*, sewage, oil, pesticides, and gasoline) into the nearshore marine environment that actually kills or injures individuals sea otters by significantly impairing their essential behavioral patterns, including breeding, feeding or sheltering.

We will review other activities not identified above on a case-by-case basis to determine whether they may be likely to result in a violation of section 9 of the Act. We do not consider these lists to be exhaustive and provide them as information to the public. You may direct questions regarding whether specific activities may constitute a violation of section 9 to the Field Supervisor, U.S. Fish and Wildlife Service, Anchorage Ecological Services Field Office, 605 West 4th Avenue, Room G–62, Anchorage, Alaska 99501.

Public Comments Solicited

We intend that any final action resulting from this proposal will be as accurate and as effective as possible. Therefore, we request comments or suggestions from the public, other concerned governmental agencies, the scientific community, industry, or any other interested party concerning this proposed rule. We particularly seek comments concerning:

(1) Biological, commercial trade, or other relevant data concerning any threat (or lack thereof) to this DPS;

(2) The location of any additional populations of this DPS;

(3) The specific physical and biological features to consider, and specific areas that meet the definition of critical habitat and that should or should not be considered for critical habitat designation as provided by section 4 of the Act;

(4) Additional information concerning the range, distribution, and size of this DPS; and

(5) Current or planned activities in the subject area and their possible impacts on this DPS.

If you wish to comment, you may submit your comments and materials concerning this proposal by any one of several methods, as listed above in **ADDRESSES.** If you submit comments by e-mail, please submit them as an ASCII file format and avoid the use of special characters and encryption. Please include "Attn: [RIN 1018–AI44]" and your name and return address in your e-mail message. If you do not receive a confirmation from the system that we have received your e-mail message, contact us directly by calling our Marine Mammals Management Office at phone number 907/786–3800. Please note that this e-mail address will be closed out at the termination of the public comment period.

Our practice is to make comments, including names and home addresses of respondents, available for public review during regular business hours. Individual respondents may request that we withhold their home address from the rulemaking record, which we will honor to the extent allowable by law. There also may be circumstances in which we would withhold from the rulemaking record a respondent's identity, as allowable by law. If you wish us to withhold your name and/or address, you must state this prominently at the beginning of your comment. Anonymous comments will not be considered. We will make all submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, available for public inspection in their entirety.

We will take into consideration your comments and any additional information received on this DPS when making a final determination regarding this proposal. The final determination may differ from this proposal based upon the information we receive.

Peer Review

In accordance with our policy published on July 1, 1994 (59 FR 34270), we will solicit the expert opinions of at least three appropriate and independent specialists for peer review of this proposed rule. The purpose of such review is to ensure that listing decisions are based on scientifically sound data, assumptions, and analyses. We will send these peer reviewers copies of this proposed rule immediately following publication in the **Federal Register**. We will invite these peer reviewers to comment, during the public comment period, on the specific assumptions and conclusions regarding the proposed listing of this species. We will summarize the opinions of these reviewers in the final decision document, and we will consider their input as part of our process of making a final decision on the proposal.

Public Hearings

The Act provides for one or more public hearings on this proposal, if requested. You may request a public hearing on this proposed rule. Your request for a hearing must be made in writing and filed at least 15 days prior to the close of the public comment period. Address your request to the Supervisor (see **ADDRESSES** section). We will schedule at least one public hearing on this proposal, if requested, and announce the date, time, and place of any hearings in the **Federal Register** and local newspapers at least 15 days prior to the first hearing.

Clarity of the Rule

Executive Order 12866 requires agencies to write regulations that are easy to understand. We invite your comments on how to make this proposal easier to understand including answers to questions such as the following: (1) Is the discussion in the **SUPPLEMENTARY INFORMATION** section of the preamble helpful in understanding the proposal? (2) Does the proposal contain technical language or jargon that interferes with its clarity? (3) Does the format of the proposal (groupings and order of sections, use of headings, paragraphing, etc.) aid or reduce its clarity? What else could we do to make the proposal easier to understand? Send a copy of any comments that concern how we could make this rule easier to understand to: Office of Regulatory Affairs, Department of the Interior, Room 7229, 1849 C. Street NW., Washington, DC 20240. You may also e-mail the comments to this address: *Exsec@ios.doi.gov.*

Executive Order 13211

On May 18, 2001, the President issued Executive Order 13211 on regulations that significantly affect energy supply, distribution, and use. Executive Order 13211 requires agencies to prepare Statements of Energy Effects when undertaking certain actions. This rule is not expected to significantly affect energy supplies, distribution, or use. Therefore, this action is not a significant energy action and no Statement of Energy Effects is required.

National Environmental Policy Act

We have determined that we do not need to prepare an Environmental Assessment and/or an Environmental Impact Statement as defined under the authority of the National Environmental Policy Act of 1969, in connection with regulations adopted pursuant to section 4(a) of the Act. We published a notice outlining our reasons for this determination in the **Federal Register** on October 25, 1983 (48 FR 49244).

Paperwork Reduction Act

This rule does not contain any new collections of information that require approval of the Office of Management and Budget (OMB) under the Paperwork Reduction Act, 44 U.S.C. 3501 *et seq.*). This proposed rule will not impose new recordkeeping or reporting requirements on State or local governments, individuals, business, or organizations. We may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

References Cited

A complete list of all references cited in this proposal is available upon request. You may request a list of all references cited in this document from the Supervisor, Marine Mammals Management Office (*see* **ADDRESSES**).

Author

The primary author of this proposed rule is Douglas M. Burn, Marine Mammals Management Office (*see* **ADDRESSES**).

List of Subjects in 50 CFR Part 17

Endangered and threatened species, Exports, Imports, Reporting and recordkeeping requirements, Transportation.

Regulation Promulgation

Accordingly, we propose to amend part 17, subchapter B of chapter I, title 50 of the Code of Federal Regulations, as set forth below:

PART 17—[AMENDED]

1. The authority citation for part 17 continues to read as follows:

Authority: 16 U.S.C. 1361–1407; 16 U.S.C. 1531–1544; 16 U.S.C. 4201–4245; Pub. L. 99–625, 100 Stat. 3500, unless otherwise noted.

2. Section 17.11(h) is amended by adding the following, in alphabetical order under MAMMALS, to the List of Endangered and Threatened Wildlife to read as follows:

§ 17.11 Endangered and threatened wildlife.

* * * * *

(h) * * *

Species		Historic range	Vertebrate population where endangered or threatened	Status	When listed	Critical habitat	Special rules
Common name	Scientific name						
MAMMALS							
*	*	*	*	*	*	*	*
Otter, northern sea	*Enhydra lutris kenyoni.*	U.S.A. (AK, WA, OR, CA).	Southwest Alaska, from Attu Island to Western Cook Inlet, incuding Bristol Bay, the Kodiak Archipelago, and the Barren Islands.	T	.....	NA	NA
*	*	*	*	*	*	*	*

Dated: December 9, 2003.

Steve Williams,

Director, Fish and Wildlife Service.

[FR Doc. 04–2844 Filed 2–10–04; 8:45 am]

BILLING CODE 4310–55–P

DEPARTMENT OF COMMERCE

National Oceanic and Atmospheric Administration

50 CFR Parts 223 and 635

[Docket No. 040202035–4035–01; I.D. 112403A]

RIN 0648–AR80

Atlantic Highly Migratory Species (HMS); Pelagic Longline Fishery

AGENCY: National Marine Fisheries Service (NMFS), National Oceanic and Atmospheric Administration (NOAA), Commerce.

ACTION: Proposed rule; request for comments; public hearings.

SUMMARY: This proposed rule would reduce bycatch and bycatch mortality of sea turtles caught incidentally in the Atlantic and Gulf of Mexico HMS pelagic longline fisheries, consistent with the requirements of the Endangered Species Act (ESA). Based upon the results of an experiment in the Northeast Distant (NED) statistical reporting area and information indicating that the level of incidental takes of sea turtles established for the HMS pelagic longline fishery has been exceeded, NMFS proposes to implement new sea turtle bycatch mitigation measures throughout the fishery, including the NED statistical reporting area, and to reopen the NED closed area. Through experimentation in the NED, certain hook and bait measures have proven to be effective at reducing sea turtle bycatch, and are expected to reduce bycatch mortality and interactions with these species. The proposed bycatch mitigation measures include mandatory pelagic longline circle hook and bait requirements, and mandatory possession and use of onboard equipment to reduce sea turtle bycatch mortality. The intent of this proposed action is to reduce interactions with, and post-release mortality of, threatened and endangered sea turtles in HMS pelagic longline fisheries to comply with the ESA and the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act).

DATES: Written comments on the proposed rule must be received no later than 5 p.m., eastern standard time, on March 15, 2004. NMFS will hold public hearings from March 2, 2004, through March 9, 2004. *See* **ADDRESSES** for specific locations, dates, and times.

ADDRESSES: The public hearing locations, dates and times are:

1. Tuesday, March 2, 2004 - North Dartmouth, MA, 7 - 9 p.m. University of Massachusetts at Dartmouth, 285 Old Westport Road, Deon Building, Room 105, North Dartmouth, MA 02747–2300;

2. Thursday, March 4, 2004 - New Orleans, LA, 7 - 9 p.m. New Orleans Airport Hilton Hotel, 901 Airline Drive, Kenner, LA 70062; and

3. Tuesday, March 9, 2004 - Manteo, NC, 7 - 9 p.m. North Carolina Aquarium on Roanoke Island, 374 Airport Road, Manteo, NC 27954–0967.

Written comments on the proposed rule should be submitted to Christopher Rogers, Chief, Highly Migratory Species (HMS) Management Division (SF/1), National Marine Fisheries Service, 1315 East-West Highway, Silver Spring, MD 20910. Comments may be sent via facsimile (fax) to 301–713–1917. Comments on this proposed rule may also be submitted by e-mail. The mailbox address for providing e-mail comments is: *0648AR80.PROPOSED@noaa.gov.* Include in the subject line of the e-mail comment the following document identifier: 0648–AR80. For copies of the Draft Supplemental Environmental Impact Statement/Regulatory Impact Review/Initial Regulatory Flexibility Analysis (DSEIS/RIR/IRFA), contact Russell Dunn at (727) 570–5447.

FOR FURTHER INFORMATION CONTACT: Russell Dunn, Greg Fairclough, or Richard A. Pearson at (727) 570–5447 or fax (727) 570–5656.

SUPPLEMENTARY INFORMATION: The Atlantic tuna and swordfish fisheries are managed under the authority of the Magnuson-Stevens Act and the Atlantic Tunas Convention Act (ATCA). Atlantic sharks are managed under the authority of the Magnuson-Stevens Act. The Fishery Management Plan for Atlantic Tunas, Swordfish, and Sharks (HMS FMP), finalized in 1999, is implemented by regulations at 50 CFR part 635. The Atlantic pelagic longline fishery is also subject to the requirements of the ESA and the Marine Mammal Protection Act (MMPA).

Management History of Sea Turtle Bycatch Reduction

Under the ESA, Federal agencies must consult with either the U.S. Fish and Wildlife Service or NMFS whenever they authorize, fund, or carry out an action that may adversely affect a threatened or endangered species or its designated critical habitat. In the case of marine fisheries, the NMFS Office of Sustainable Fisheries consults with its Office of Protected Resources. After consultation, NMFS issues a Biological

DRAFT
AP COMMITTEE REPORT

The AP Committee met on May 7, 2004 at the Windham Hotel, Seattle/Tacoma Airport, Seattle, Washington. Attending the meeting were Roy Hyder, Committee Chair, and Committee members Dennis Austin and Kevin Duffy.

The purpose of the meeting was to conduct a preliminary review of the organization and functionality of the Advisory Panel and formulate suggestions for Council consideration.

The Committee reviewed the Council's Policy on Advisory Panel Structure and Operations, dated December 13, 1988, as well as information from the other Councils describing their organization of advisory functions. The Committee members concur the North Pacific Management Council approach for obtaining participation of recognized experts from the fishing industry and related fields is the preferred model. None of the other Council organizational models were found to be attractive to the Committee. The other Councils' Advisory Panels tend to be species specific and usually involve a greater number of members.

The Committee identified several Advisory Panel issues that warranted discussion. Those areas of interest included the number of Advisory Panel members, attendance, voting, timing of the Advisory Panel Report to the Council, term limits, minority reports, and public testimony.

The Committee's suggestions for consideration by the Council are reflected in the following draft proposal for changes to the Policy on Advisory Panel Structure and Operations. Current language to be deleted is bracketed [], new language to be added is underlined, and discussion comments are in bold typeface. Discussion comments are informational only and are not intended to be included in the Policy.

AP Policy adopted by Council in 1988 follows:

NORTH PACIFIC FISHERY MANAGEMENT COUNCIL
Policy on Advisory Panel Structure and Operations*

The North Pacific Fishery Management Council appoints an Advisory Panel of recognized experts from the fishing industry and several related fields.

Recognizing that to best serve the Council the AP should represent a variety of gear types, industry and related interests as well as a spread of geographic regions of Alaska and the Pacific Northwest having major interest in the fisheries off Alaska; and Recognizing that the Council relies on the AP for comprehensive industry advice on how various fishery management alternatives will affect the industry and local economies, on potential conflicts between user groups of a given fishery resource or area, and on the extent to which the United States will utilize resources managed by the Council's fishery management plans; and

Recognizing that gear conflicts and allocations will be the issue of greatest concern for the next few years.

The Council approves the following with respect to its Advisory Panel's structure and operations:

Size

The AP will consist of 20 members [(increased in 1991 and 1992 to 22)]. However, the Council will not necessarily keep all seats filled. This arrangement should allow sufficient flexibility in funding so the

Council can invite as necessary other individuals with particular expertise to work with the AP on an ad hoc basis.

Discussion: The Committee discussed membership at considerable length. The Committee concurs that AP representation for the three states should continue to be in the same proportion as the voting membership of the Council from the states. The Committee recommends AP membership not exceed 20, recognizing that this actually equates to a reduction from23. The AP membership of 20 members approved in 1988 was increased by the Council in 1991 to 21 and increased again in 1992 to a total of 22. Additionally, a member was later added for observer representation resulting in a total of 23. Recent action by the Council has reduced the membership back to 20.

The Council looked at AP membership from a low of 15 to the recommended membership of 20, considering the issue of proportionality with each combination. One proposal considered to provide further reduction and continue proportionality between the states was an AP membership of 17 with Alaska having 10 members, Washington 5 members, and Oregon 2 members.

Qualifications

The Council will give highest priority to the following considerations when selecting AP members:

(1) Of paramount importance is the demonstrated ability of the candidate to be objective and to consider all aspects of an issue.

(2) The AP members should be of top quality and caliber and be committed to full and active participation for each meeting during their term.

(3) The candidate should be considered because of the experience he/she brings to the Council rather than his/her political clout or connection.

(4) The candidate should be an active, involved member of his/her community and business to ensure the best and most pertinent input into the Council and likewise be responsible and diligent in reporting Council decisions and concerns back to his/her community/business.

(5) The AP membership should represent a broad geographic spread both for Alaska and the Pacific Northwest. Representation for the three states should be in the same proportions as those of the voting membership of the Council. However, recognizing that issues and priorities will change, the Council cautions that no seat is reserved for a particular area.

(6) The AP membership should represent a variety of interests within the fishing industry and other related fields. While it is hoped that major gear types from the harvesting sector will be broadly represented, as with geographic representation, no particular seat is guaranteed to a gear type or fishery.

(7) In addition to the above mentioned interests, the l will include representatives having an interest in recreational fishing, environmental concerns, and consumer/marketing issues.

Note: It is expected that as the issues and concerns of the Council change and evolve so, too, will the profile of the membership of the AP.

Terms

[To allow maximum flexibility in making appointments,] AP members will serve for [one]three-year terms beginning with the first meeting each calendar year. All members will be appointed by and serve at the pleasure of the Council and may be reappointed to two subsequent consecutive terms. Appointments will be staggered to provide for the appointment of 1/3 of the membership of the AP each year. Persons wishing to serve on the Advisory Panel may submit their names with a short resume to the Executive Director who will keep for the calendar year a list of candidates at the Council headquarters. Resumes and requests to serve will not be retained after the annual appointment process. The Council may use this list of candidates in choosing Panel members to fill full-year terms or interim vacancies, but may also solicit individuals not on the list if a particular combination of experience and expertise is deemed desirable. The Council Chairman is authorized to remove members from the Panel and to fill interim vacancies on the AP subject to confirmation by the Council at the next regular meeting. Interim appointments are for the remaining unexpired term of the vacancy.

> **Discussion: The Committee's consideration of term limits balanced the value of new membership resulting from term limits with the benefit of retaining the corporate knowledge of experienced members of the AP. It is the intent of the Committee that the term limits apply to three consecutive terms. If an AP member serves one or more terms and takes a break of at least one term, then that member would be eligible for reappointment for another three consecutive terms. It is the Committee's recommendation that the above-referenced rule changes shall apply with appointments of January 2005.**

Members of the Panel serve without compensation. They may be paid their actual expenses for travel and per diem incurred in the performance of their duties during the days in which the panel is in session[, except for t]. The chairman, [or] vice-chairman or the AP member designated to report to the Council may be paid expenses for additional days when necessary and approved by the Council chair. Security clearances for Panel members are requested as necessary.

Operations

The Chairman and Vice-Chairman of the AP are nominated for one-year terms by the Panel from among its members and are confirmed by the Council.

The Panel meets as a whole, or in part, at the request of the Chairman of the Panel with approval of the Chairman of the Council, as often as necessary to fulfill the Panel's responsibilities, taking into consideration time and budget constraints. Panel members are expected to attend all meetings and participate fully at these meetings including voting on each issue.[and p] Poor attendance will be cause for a member being removed. Generally, acceptable absences will be the result of or involve personal emergencies or unavoidable fishery related conflicts.

In addition, the Panel, or members thereof will attend Council meetings at the request of the Council Chairman to advise the Council on particular fisheries problems. Panel members will also attend public hearings on Council-related activities, as requested by the Council Chairman. Expenses will be approved for any such attendance requested by the Council Chairman.

The Panel will set up such workgroups as the Chairman of the Panel and the Council deem necessary to carry out the Panel's duties. Additional members outside the Panel may be added to these workgroups as deemed appropriate by the Council Chairman.

The Council or the Council Chairman may assign the agenda topics for the Advisory Panel to discuss at its meetings. These topics will not normally include all items on the Council's agenda, but the AP may consider any topic or issue it deems important to bring to the Council's attention, time permitting. The panel members should be given sufficient advance notice of these topics to allow adequate preparation before the meeting.

The panel is expected to conduct meetings in a timely fashion with the objective of presenting AP recommendations to the Council consistent with the Council's order of business. Generally, the panel should utilize Council procedures limiting the time allowed for public testimony and questions by AP members.

The Advisory Panel Chairman or designee will be responsible for reporting the Panel's recommendations to the Council. This report should focus on the [frill] full discussion of the pros and cons of the issues in addition to the results of any vote that was taken, including minority reports which are signed by more than one member and submitted in writing. All minority reports consistent with the above standard shall be included in the AP report to the Council.

The Executive Director of the Council shall, upon request of the Chairman of the Panel, provide such staff and other support as the Council considers necessary for Panel activities, within budgetary limitations.

LGL Alaska Research Associates,
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Notice of a Research Cruise
Southeast Alaska and Prince William Sound
August-September 2004

Fishery Participants,

Researchers from universities in Alaska, Oregon and Florida plan to conduct **seafloor profiling and sediment coring** for about one month this summer in Southeast Alaska, the Gulf of Alaska, and Prince William Sound. This project is one part of a worldwide survey funded by the United States National Science Foundation (NSF) to locate sedimentary records of environmental change to better understand the potential impacts of future global warming. Specifically, the Alaska surveys are designed to study the **regional effects of glacier melting on the global climate as well as on biological productivity (including fish) of the North Pacific Ocean.**

The cruise will occur during a four-week period beginning about August 21 and continuing through late September 2004. The survey will be conducted from a **230-foot oceanographic research vessel, the R/V *Maurice Ewing***. This vessel is owned by NSF and operated for NSF by Lamont-Doherty Earth Observatory, a part of Columbia University. The vessel is equipped with commercial bathymetric mapping sonars of 3.5 and 12.0 kHz and will map geological features of the ocean floor. These mapping surveys are conducted at the normal cruising speed of approximately 10 knots and do not affect the mobility of the vessel. In selected areas (identified in the attached charts), the vessel will tow and operate a small acoustic source consisting of two "Generator Injector" (GI) airguns and a 1,500-meter array of listening devices. The seismic surveys will map geological features of the ocean floor and features a short distance beneath the bottom. **During these operations, the vessel will cruise at approximately 2 to 3 knots and will have reduced mobility**. Following retrieval of the towed arrays, the ship will take bottom core samples. Depending on the depth at the site, the coring procedure could take from 6 to 12 hours during which the vessel will remain stationary.

The commercial bathymetric sonars used by the R/V *Maurice Ewing* are similar to those used by the National Oceanic and Atmospheric Administration's (NOAA) to produce navigational charts. The GI airgun equipment is related to that used during seismic surveys for oil and gas exploration, but with a much reduced power level. High-power seismic surveys can disturb marine mammals and, at times, fish. Although this project will involve much less powerful airguns, as a precaution, marine mammal observers will be placed on the bridge of the vessel and operations will be modified or halted whenever marine mammals come within a distance prescribed by NOAA Fisheries. Given the use of marine mammal observers and the use of a low-power airgun system, little, if any, environmental impact (including disturbance to marine mammals or fish) is expected.

Detailed Cruise Plans

The vessel will enter Alaskan waters about August 24, a time when commercial and recreational fishing activities may be occurring in the study areas. While in transit and collecting bathymetric data, the vessel is not expected to interfere with any fishing activities. However, there may be

some interactions during deployment of the towed array and during coring operations. An attached chart (Map 1) shows the planned cruise tracks for the vessel in Southeast Alaska and the Gulf of Alaska. Also attached are some larger scale maps of the cruise tracks in selected bays and nearshore areas (Maps 2-10). **It is the goal of the survey operation to prevent or minimize interactions between the research cruise and fishing activities.**

LGL Alaska Research Associates, Inc. is assisting Lamont-Doherty Earth Observatory, NSF, and the project researchers in dealing with environmental and regulatory issues. Project personnel, assisted by LGL, will work with fishery managers in Alaska to accomplish the goal of minimizing interactions. We are **requesting input from fishing groups and Regional Aquaculture Associations in order to prevent any undesirable interactions.** Please review the attached charts and advise us of any concerns or suggestions you may have regarding this research cruise.

During the cruise, the *RV Maurice Ewing* will **broadcast on VHF prior to commencing reduced mobility surveys and coring operations. In addition, broadcasts will be made if weather or equipment mandates changes from the proposed cruise plan.**

As is required by U.S. law for all marine seismic surveys, the cruise researchers have applied for an Incidental Harassment Authorization (IHA) from the National Marine Fisheries Service (NMFS) to authorize any "incidental harassment" of small numbers of marine mammals during the seismic survey. In addition, an Environmental Assessment (EA) in support of the IHA application has also been submitted. A detailed description of the project activities, planned mitigation measures, and an assessment of the potential environmental impacts of the project are available in the IHA application and associated EA. Both of these documents are available for review and can be obtained from LGL's Anchorage office at the address below. An Alaska Coastal Management Program Questionnaire and Certification Statement to the State of Alaska Office of Project Management and Permitting has also been filed. These documents have been prepared to demonstrate that the planned project is consistent with federal, state, and local policies regarding the use of the coastal zone, and nearshore waters.

Please feel free to distribute this letter and the attached charts to anyone who may be interested. If you identify a potential conflict or have any questions or comments, **please contact David Gaudet or Steve A. MacLean as soon as possible** at the following numbers or email addresses:

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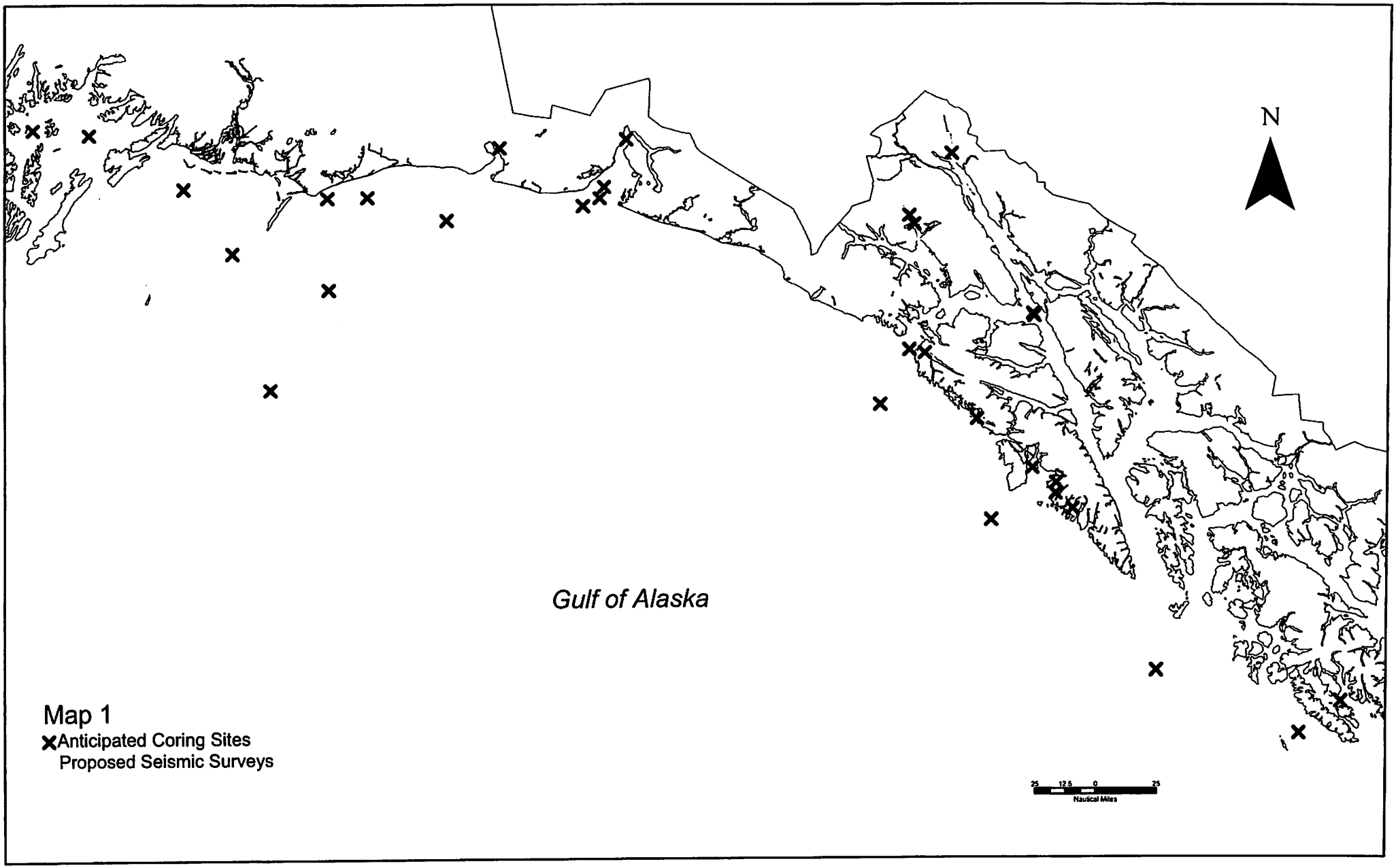
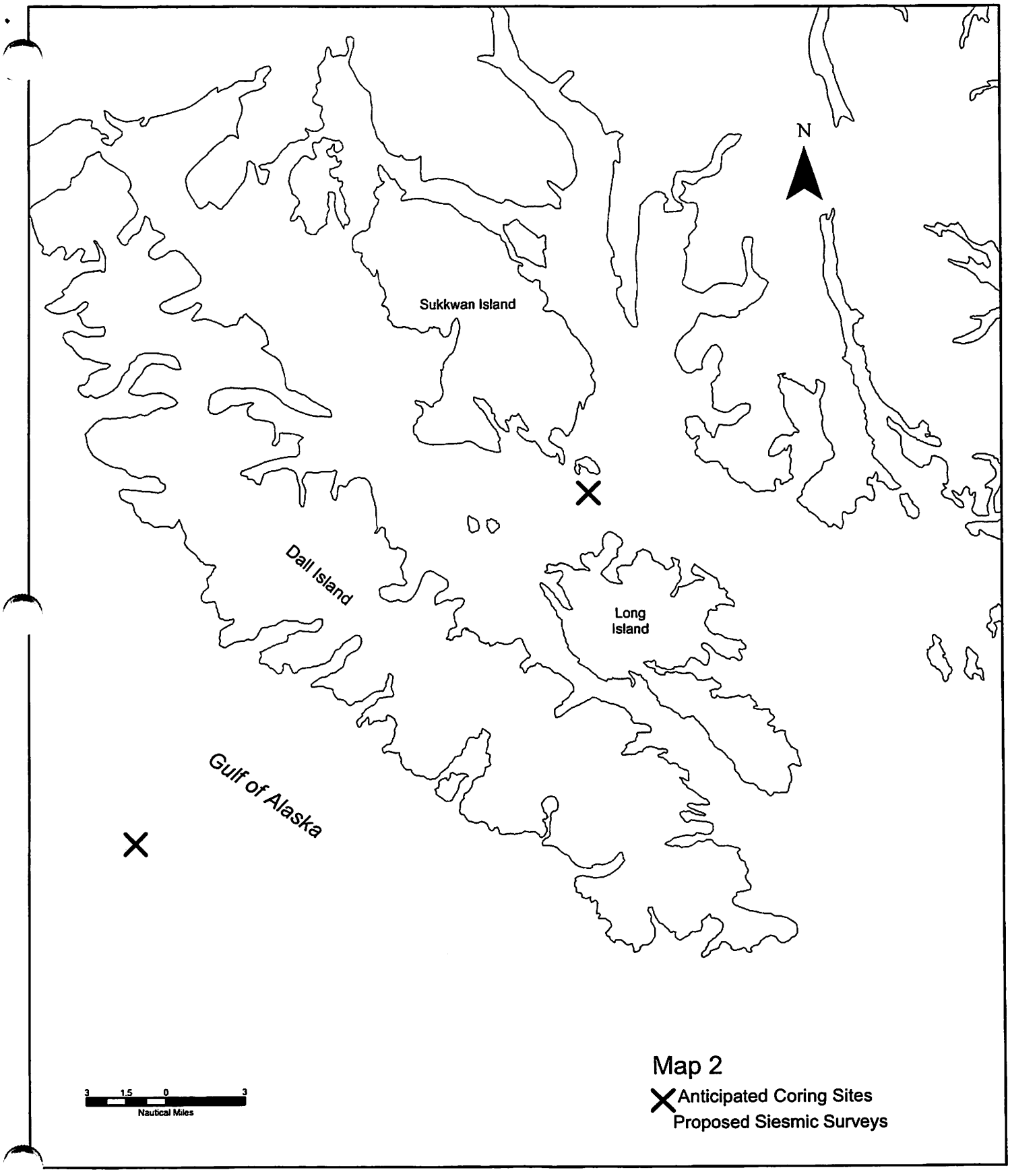


LDEO Southeast Alaska 2004 cruise: survey and coring locations.



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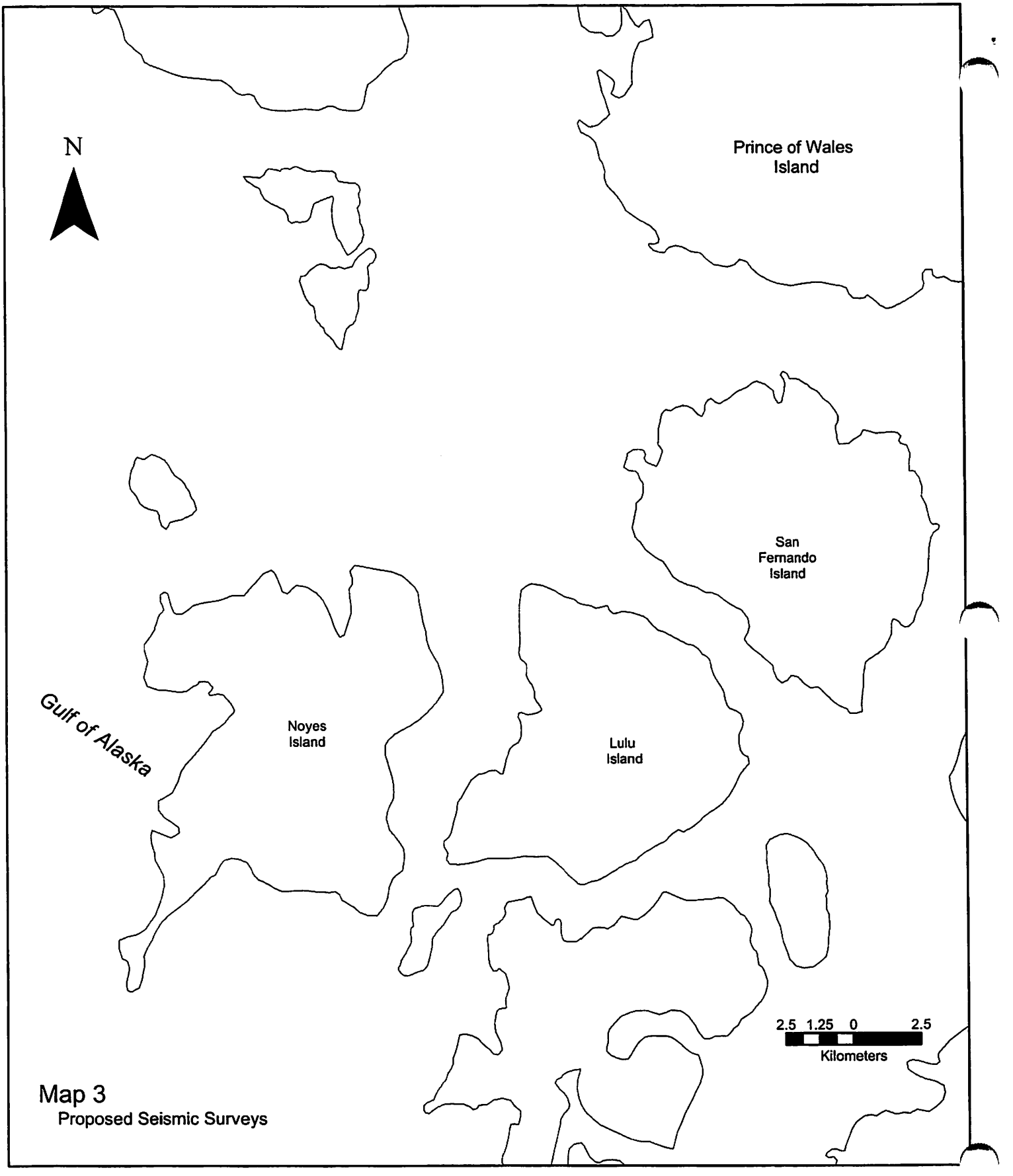

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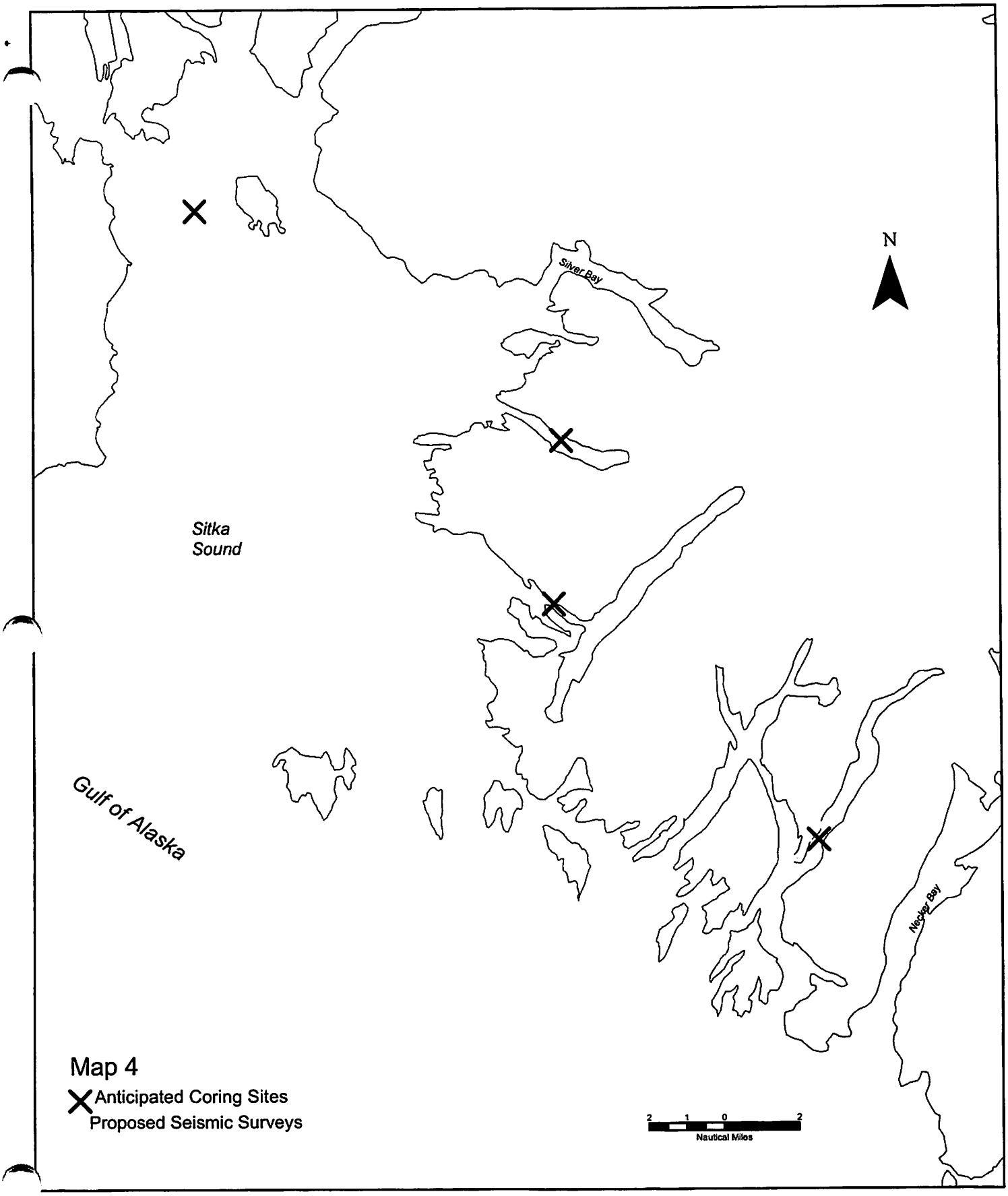

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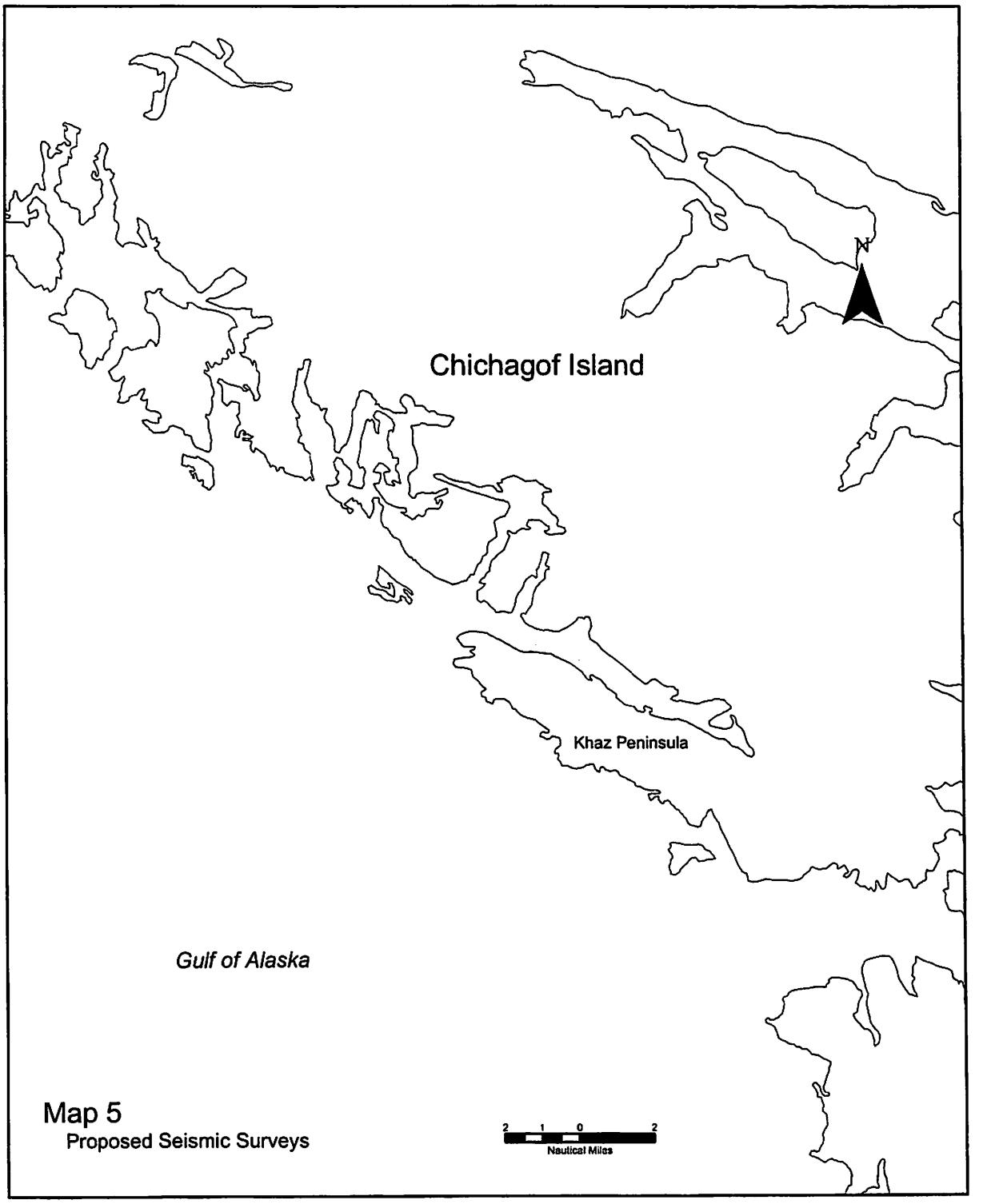

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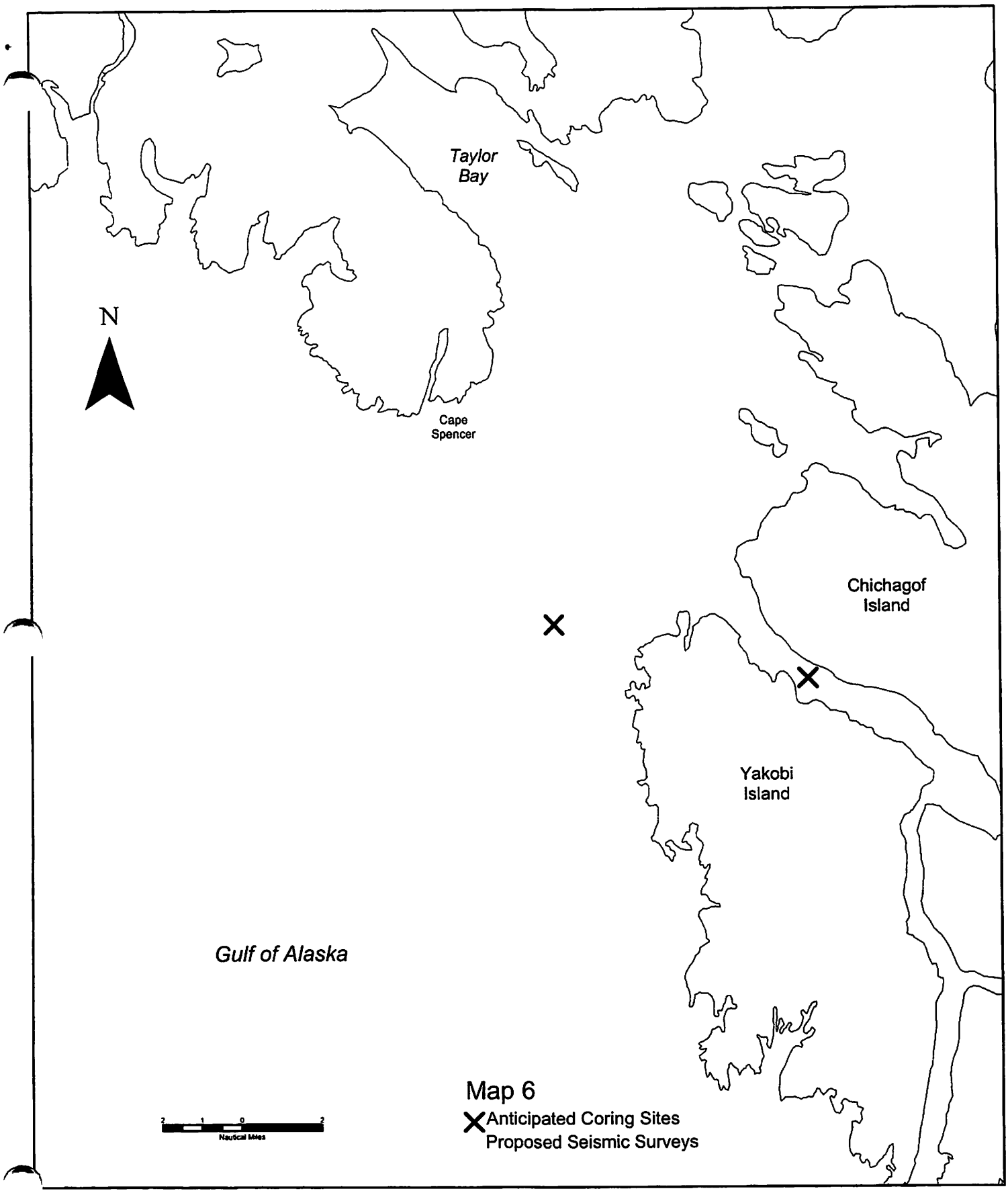

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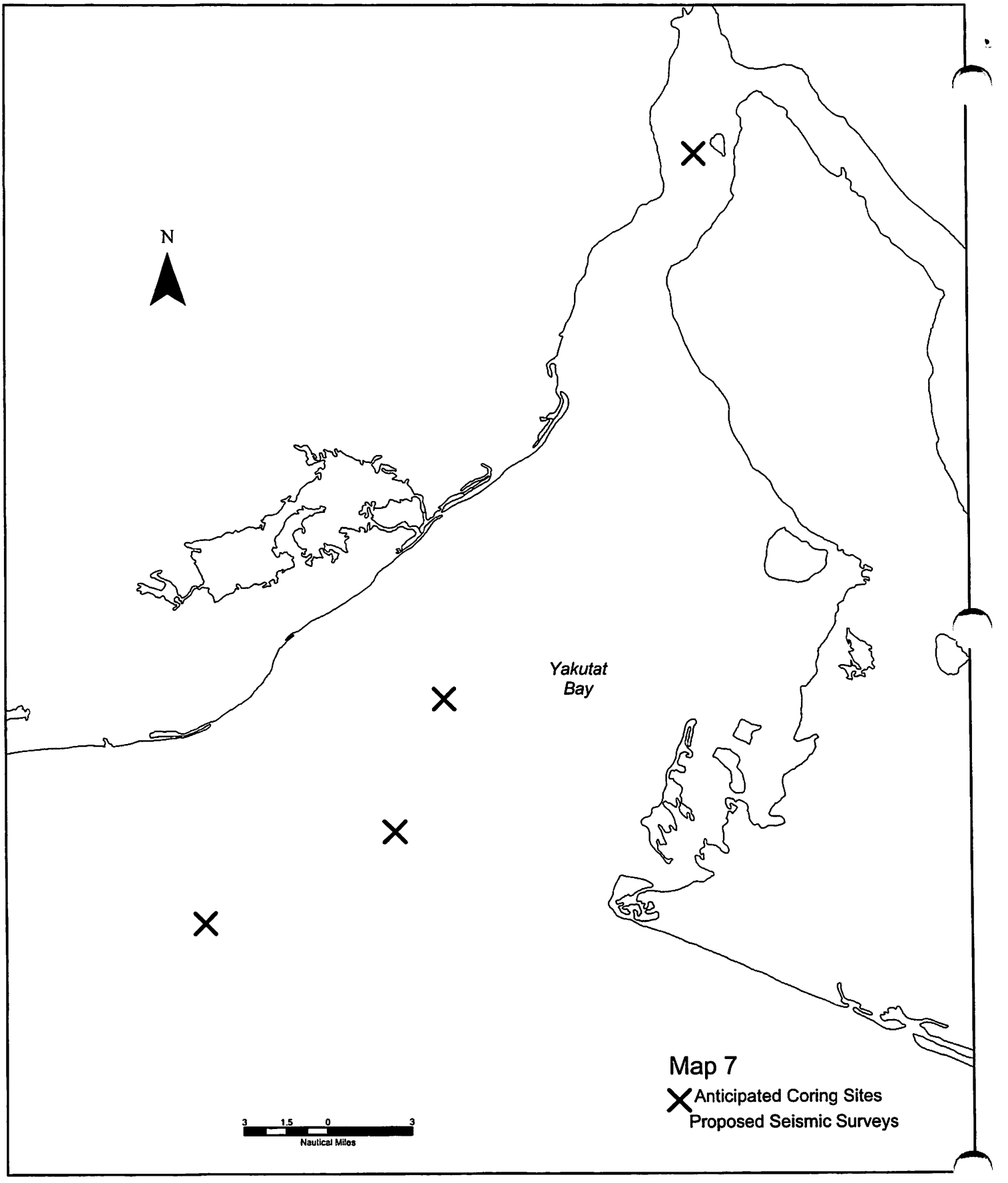

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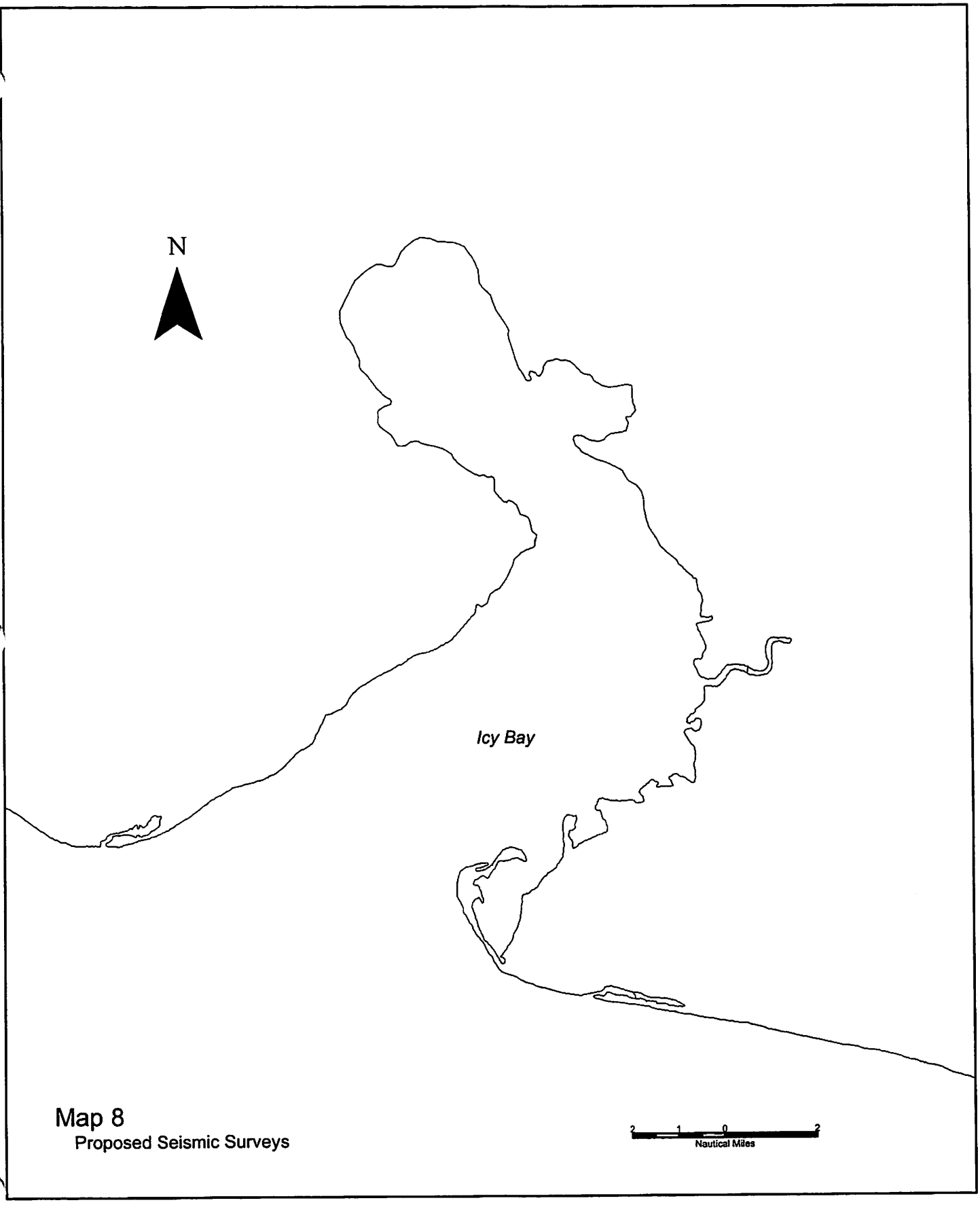

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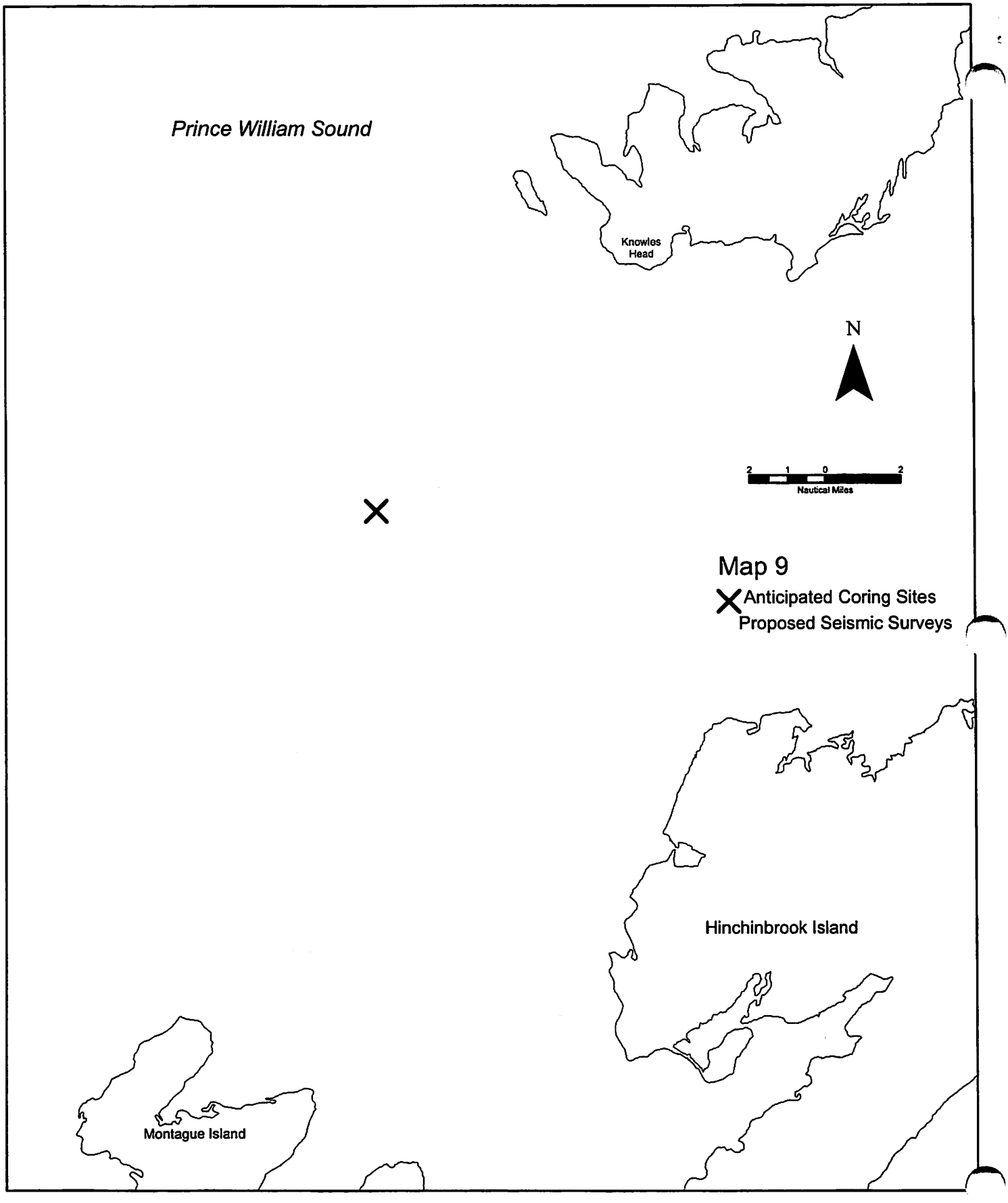
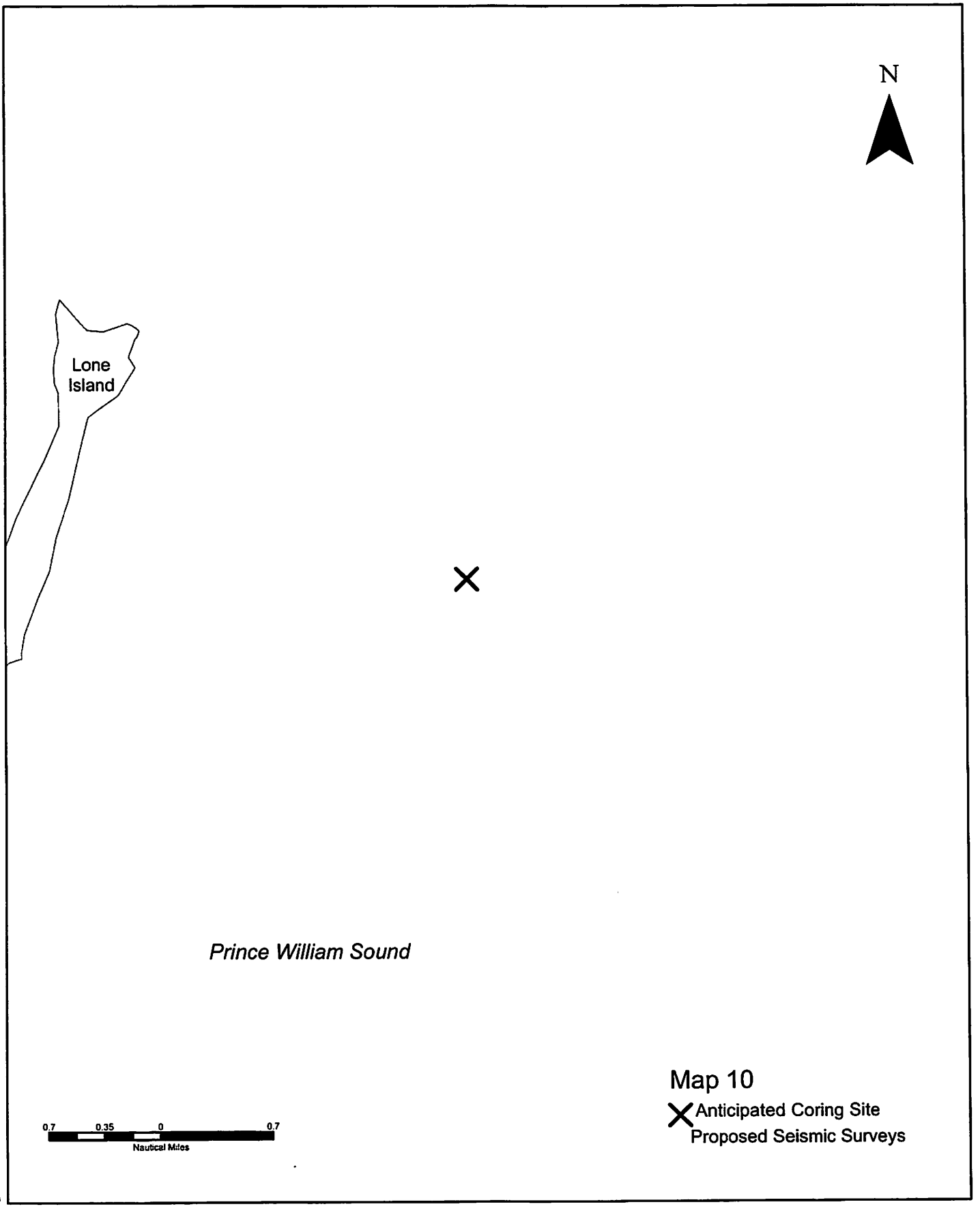


LDEO Southeast Alaska 2004 cruise: survey and coring locations.



LDEO Southeast Alaska 2004 cruise: survey and coring locations.

NORTH PACIFIC RESEARCH BOARD

"Building a clear understanding of the North Pacific, Bering Sea, and Arctic Ocean ecosystems that enables effective management and sustainable use of marine resources."

1007 West 3rd Avenue, Suite 100
Anchorage, AK 99501
Phone: (907) 278-6772 Fax: 278-6773

May 8, 2004

Chris Oliver, Executive Director
North Pacific Fishery Management Council
605 West 4th Avenue, #306
Anchorage, Alaska 99501-2252

Dear Chris:

Please find attached a brief overview of research projects funded by the North Pacific Research Board through 2004. It responds to the April 26, 2004, request from Dave Witherell for a listing of projects that address the research priorities identified by the Council's Scientific and Statistical Committee. I have provided a special table that compares the priorities to projects by number.

Our projects fall into seven broad categories: oceanic and estuarine salmon; fisheries habitat; other fisheries-related research; marine mammals; marine food web ecological studies; education, outreach and synthesis information; and contaminants. Though we have funded 61 projects totaling nearly $12 million, about 25 appear to directly address the SSC research priorities, though it is difficult to categorize several projects because of the broad language of some of the SSC research priorities.

In writing our science plan, I intend to include a central role for the Council and the SSC to help us identify research priorities on an annual basis. Over the long term, I hope that the Board's research will be responsive to Council needs and will help the Council maintain its outstanding record of sustainability of the living marine resources off Alaska.

Please contact me if you need any additional information.

Sincerely,

Clarence Pautzke, Ph.D.
Executive Director

Comparison of NPFMC SSC research priorities and NPRB-funded research through 2004.

SSC Research Topic	NPRB study # (see attached project descriptions)
A. Critical Assessment Problems	
Better rockfish assessment data; stock structure and biological variables	17
Models: computer simulations, sensitivity and retrospective analyses.	
Life history data for groundfish, especially rockfish	30, 32
Stock structure and movement of groundfish, esp. spawning distribution	28
B. Stock Survey Concerns	
Improving surveys to assess rockfish, including nearshore pelagics	13
Develop methods to measure fish density in untrawlable habitats	14
C. Expanded Ecosystem Studies	
Influence of environmental/climate variability on recruitment; esp. crab	18, 20, 39, 40, 41, 42, 45
Status and distribution of forage fish	16, 27, 49, 50
Mapping of benthic habitats for EFH of groundfish and forage fish	9, 10, 11, 12
D. Social and Economic Research	
Cost data for fishing and processing	29
Pre/post economic analysis of crab and GOA groundfish rationalization	
Data for community impact analysis	25
Integrated multi-species fisheries models for EISs on large mgmt actions	
E. Bycatch	
Sources of variability in actual and estimated bycatch rates	13
F. Monitoring	
Video monitoring to improve catch and discard estimates	26
G. Adaptive management approaches for Sea Lion Issues	

NORTH PACIFIC RESEARCH BOARD

"Building a clear understanding of the North Pacific, Bering Sea, and Arctic Ocean ecosystems that enables effective management and sustainable use of marine resources."

Tylan Schrock, Chairman
Jim Balsiger, Vice-Chairman
Clarence Pautzke, Executive Director

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Marine Research Projects Approved by the North Pacific Research Board for 2002-2004

The North Pacific Research Board has approved 61 projects totaling $11.8 million in new marine research supported by the Environmental Improvement and Restoration Fund. The selections focus on addressing pressing fisheries and marine ecosystems information needs and fall into seven broad categories of research:

Categories of Research	Number of Projects	Total Funding	Percent
Oceanic and Estuarine Salmon	8	$2.19 million	19
Fisheries Habitat	6	$2.19 million	19
Other Fisheries-Related Research	18	$2.14 million	18
Marine Mammal	6	$953,000	8
Marine Food Web Ecological Studies	16	$3.58 million	30
Education and Outreach and Synthesis Information	5	$623,000	5
Contaminants	2	$157,000	1

All research is performed in the Alaska region, but principal investigators come from the broader research community throughout the nation. Most hail from Alaska and along the West Coast:

Alaska
Alaska Department of Fish and Game
Alaska Longline Fishermen's Association – Sitka
Alaska Sea Grant – UAF
Alaska SeaLife Center – Seward
Bristol Bay Science & Research. Inst. – Dillingham
Central Bering Sea Fishermen's Assoc. – St. Paul
NOAA
- Auke Bay Laboratory – Juneau
- Kodiak Fisheries Science Center

Prince William Sound Science Center
U.S. Fish and Wildlife Service – Anchorage
U.S. Geological Survey – Anchorage
University of Alaska Anchorage
University of Alaska Fairbanks, Juneau & Sitka
URS Alaska Operations

Washington
International Pacific Halibut Commission - Seattle
Natural Resources Consultants – Seattle
NOAA (Seattle)
- Alaska Fisheries Science Center
- National Marine Mammal Laboratory
- Northwest Fisheries Science Center
- Pacific Marine Environmental Laboratory

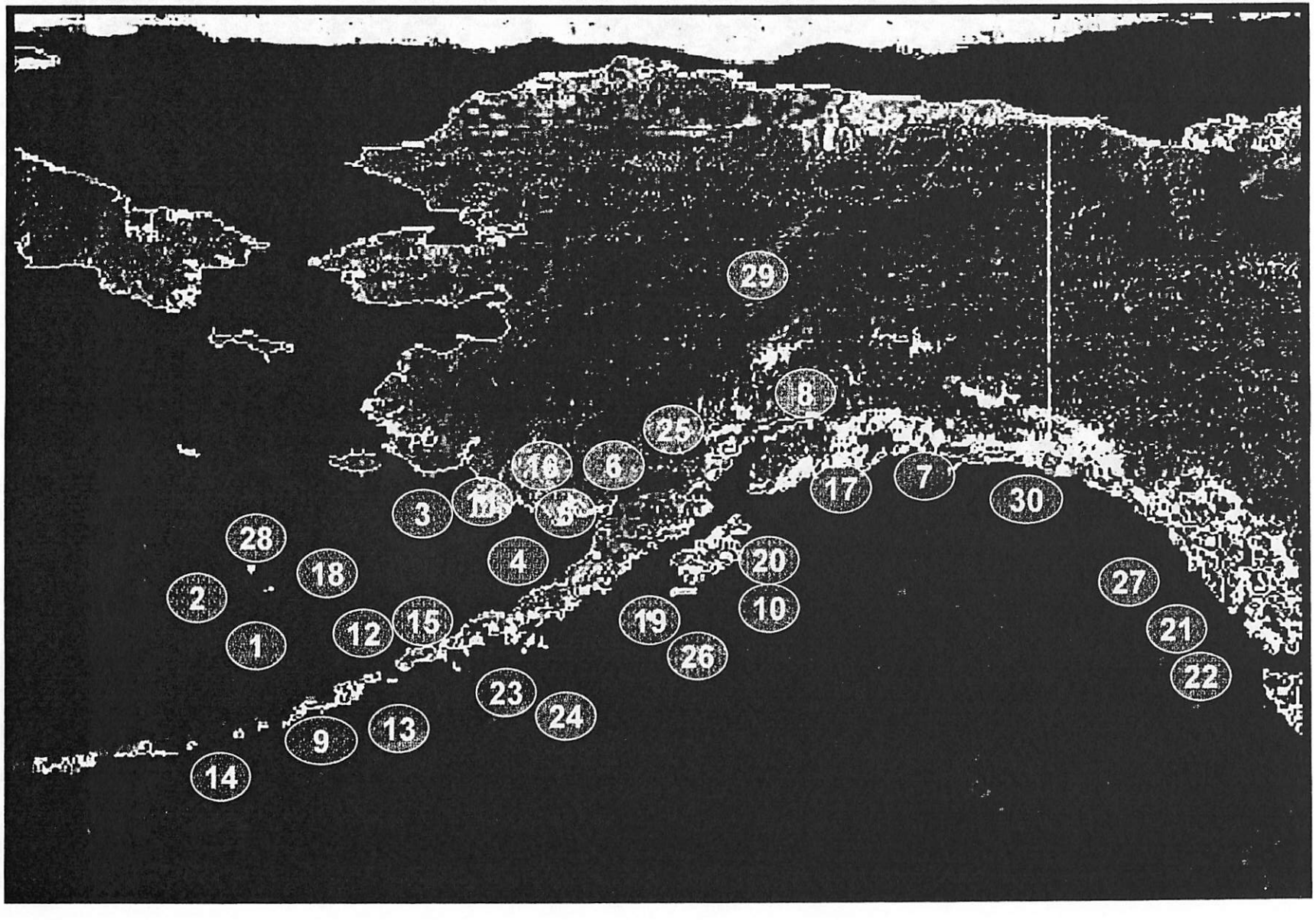
University of Washington – Seattle

Other States
NOAA Environ. Technology Lab – Boulder, CO
Louisiana State University – Baton Rouge, LA
Old Dominion University – Norfolk, VA

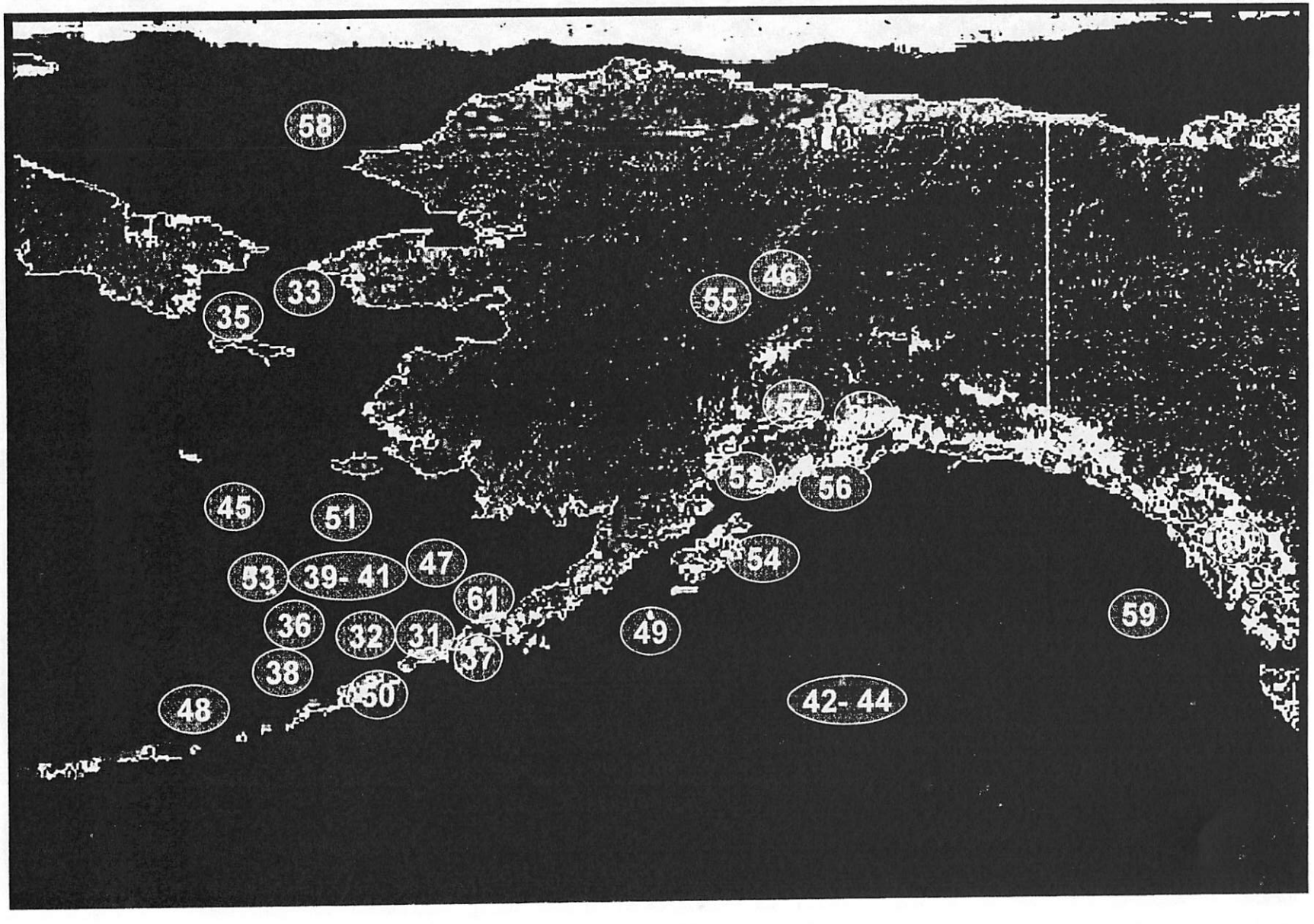
Oregon and California
Hatfield Marine Science Center – Newport
Oregon State University - Corvallis
Hubbs SeaWorld Research Institute – San Diego
NOAA SW Fisheries Science Center – San Diego
Scripps Institute of Oceanography – La Jolla
Pt. Reyes Bird Observatory (PRBO) – Stinson Beach
University of California – Davis & San Diego

Canada
Department of Fisheries and Oceans
North Pacific Anadromous Fish Commission
Sir A. Hardy Foundation for Ocean Sciences
Simon Fraser University – BC
Coastal and Ocean Resources, Inc. – BC

North Pacific Research Board: Projects 1-30



North Pacific Research Board: Projects 31-61



Oceanic and Estuarine Salmon Research: $2.19 million

1. **NPAFC salmon tagging and genetics in the Bering Sea** ($190,800)
(R0204)

North Pacific Anadromous Fish Commission. Salmon tagging and genetics research to understand the distribution patterns, habitat utilization, and movements of Bering Sea salmon stocks through an at-sea tagging program of immature and maturing fish.

2. **Open ocean salmon stock structure and dynamics in the Bering Sea** ($500,000)
(R0303)

North Pacific Anadromous Fish Commission. Will provide better understanding of salmon community structure and improve ability to predict effects of short- and long-term climate change on ocean production of regional salmon stocks. International in scope, involving US, Canada, Russia and Japan. Includes genetic stock identification and early marine survival of chum, chinook, and sockeye salmon. Continuation of R0204.

3. **Early marine ecology of juvenile chums in Kuskokwim Bay** ($624,025)
(R0327)

University of Alaska Fairbanks and USGS. Goal is to assess effects of physical and biological environmental factors on feeding, condition, and growth of juvenile chum salmon using a bioenergetically-based food web model coupled with directed sampling for diet composition, growth, size structure, and energy content.

4. **Evaluation of alternative reasons for collapse of Kvichak sockeye runs** ($192,850)
(R0321)

Bristol Bay Science and Research Institute will host series of annual technical workshops to describe changes in enumeration programs for Kvichak sockeye over the past 30 years to determine whether the recent collapse was related to freshwater or marine factors. Will conduct comparative analysis of dynamics and age structure of several Bristol Bay sockeye salmon populations.

5. **Run-timing analysis for Bristol Bay sockeye** ($24,930)
(R0317)

Natural Resources Consultants, Seattle. Update and publish migration timing model that quantifies effects of oceanographic conditions and biological variables on Bristol Bay salmon migration timing and provide forecast of Bristol Bay and Kvichak River sockeye migration timing in 2003.

6. **Genetic stock identification of Western Alaska sockeye salmon** ($216,515)
(R0205)

NOAA Auke Bay Lab and Alaska Department of Fish and Game. Use of gene markers to track migration and relative survival of populations of sockeye salmon juveniles exiting Bristol Bay and the eastern Bering Sea.

7. **Sockeye and coho juvenile survival in estuarine waters of the Copper River Delta** ($400,000)
(R0310)

Prince William Sound Science Center. Couples intensive field surveys and otolith studies to quantify ages of outmigration and estuarine residence time for coho and sockeye within the Copper River Delta. Will provide information on survival rates in estuarine areas which are seldom studied.

(Note: Project numbers in parentheses may be used to learn more about each project at www.nprb.org under "Research.")

8. **Statewide data warehouse of salmon size, age and growth records** ($43,066)
(R0311)

Alaska Department of Fish and Game. Will start process for establishing an electronic data warehouse environment through which historical salmon sampling and scale pattern data for salmon size, age and growth records can be maintained and updated annually from collections throughout the state.

Fisheries Habitat Research: $2.19 million

9. **Mapping deep sea coral distributions in the Aleutians** ($1,303,001)
(R0304)

University of Alaska Fairbanks, NOAA Auke Bay Lab and Alaska Department of Fish and Game. Detailed mapping of coral and sponge habitats in Aleutians and develop statistical model to predict coral and sponge distribution as a function of measurable environmental characteristics. Determine importance to commercially valuable fish and invertebrates and provide information to North Pacific Fishery Management Council.

10. **Evaluation of essential fish habitat for juvenile flatfish around Kodiak** ($261,102)
(R0301)

Oregon State University and NOAA Alaska Fisheries Science Center. Integrated research program, combining small-mesh trawl surveys, higher resolution/spatially explicit camera sled surveys, and field experiments to examine importance of emergent structure in the behavior, ecology and survival of juvenile halibut and northern rock sole near Kodiak Island.

11. **Pilot nearshore habitat mapping using acoustic and visual techniques** ($120,000)
(R0201)

Coastal and Ocean Resources, Inc. Pilot biophysical mapping project using a combination of acoustic and visual tools for habitat delineation, including both biological and substrate characteristics in Togiak Bay.

12. **Investigations of a skate nursery** ($140,936)
(F0415)

NOAA Alaska Fisheries Science Center. Will investigate potential skate nursery area in southeastern Bering Sea where fishery data suggest an area of heavy use by skates for the deposition of egg cases.

13. **Ecological value of juvenile rockfish habitat** ($163,402)
(F0416)

NOAA Alaska Fisheries Science Center. Will assess the value of habitat in the Aleutian Islands to juvenile rockfish by examining abundance, condition and growth in five study areas using two acoustical techniques to map habitat.

14. **Reproductive ecology of Atka mackerel** ($200,000)
(F0417)

NOAA Alaska Fisheries Science Center and University of Alaska Fairbanks. Will locate and characterize Atka mackerel nesting habitat, analyze the spatio-temporal distribution of populations, produce an embryonic development series, investigate the temporality of spawning, nesting, hatching, and the annual and spatial variation in reproductive output.

(Note: Project numbers in parentheses may be used to learn more about each project at www.nprb.org under "Research.")

Other Fisheries-Related Research: $2.14 million

15. Application of new sonar technology to reducing salmon bycatch in pollock fisheries ($121,918)
(R0202)

NOAA Alaska Fisheries Science Center. New sonar developed to study the dynamic behavior of salmon caught in trawl nets to help in developing effective excluders that may be used to reduce salmon bycatch in the pollock fishery.

16. Environmental cues for herring spawning ($131,408)
(R0208)

University of Alaska Fairbanks and Juneau. Will develop predictive models for Pacific herring spawning at Togiak for use by managers. Will include spatially explicit models to predict interannual variability of spawning events, particularly timing and location.

17. Two species of rougheye rockfish in Northern Gulf of Alaska ($76,776)
(R0209)

University of Alaska Fairbanks. Microsatellite and DNA analysis of rougheye rockfish sampled in Prince William Sound, Cook Inlet, and inside waters of Southeast Alaska to learn whether one rockfish type is associated with nearshore or inside waters.

18. Predator-prey relationships for groundfish and forage fish ($350,000)
(R0305)

NOAA Alaska Fisheries Science Center. Continue time series of fish food habits data in the North Pacific by further collection of groundfish stomach samples during groundfish bottom and midwater trawl surveys. Analyze fish stomachs collected in 2000-2002 and update Bering Sea multispecies virtual population analysis model to provide more current advice on implications of fishing strategies on the ecosystem via the Ecosystems Chapter in the stock assessment documents for the North Pacific Fishery Management Council.

19. Causes of bitter crab disease in Tanner crab ($99,805)
(R0306)

University of Washington, NOAA Alaska Fisheries Science Center, Alaska Department of Fish and Game. Investigate impact of bitter crab syndrome on North Pacific Tanner crab populations, elucidate the life history of the parasitic dinoflagellate *Hematodinium* and determine whether one or more species of parasitic dinoflagellates cause the syndrome.

20. Cultivation techniques for Blue King Crab larvae ($85,561)
(R0316)

NOAA Kodiak Fisheries Science Center. Cultivation and settlement of blue king crab larvae and verification of ability to raise them in laboratory and optimum conditions for cultivation. Will study settlement behavior and habitat selection, survival of larval and juvenile stages, and competitive interactions with red king crab.

(Note: Project numbers in parentheses may be used to learn more about each project at www.nprb.org under "Research.")

21. Sperm whale interactions with longline fisheries off Southeast Alaska ($184,518)
(R0309)

University of Alaska Southeast Sitka Campus, Alaska Department of Fish and Game, Hubbs-SeaWorld, Alaska Longline Fishermen's Association. Collect information, working with local fishermen, on the timing of interactions seasonally and diurnally, and identify sperm whales occurring on the fishing grounds through photographic identification and genetic samples. Will provide information to help minimize sperm whale depredation on longline gear and sablefish. This project is related to F0412)

22. Sperm whale and longline fisheries interactions - passive acoustic component ($68,626)
(F0412)

University of Alaska Southeast Sitka Campus and Scripps Institute of Oceanography. Will attach a set of autonomic acoustic recorders to anchor lines of a longline deployment, converting the fishing gear into a vertical acoustic array. This project is related to R0309.

23. Short-tailed albatross interactions with North Pacific commercial fisheries ($99,321)
(R0322)

Oregon State University and U.S. Fish and Wildlife Service. Capture up to 15 short-tailed albatrosses and attach satellite transmitters for 4-6 months to learn about migrations and interactions with commercial fisheries. Characterize oceanographic habitats exploited by foraging albatrosses and quantify overlap with fisheries areas.

24. Assessment of trawl third wires as a threat to seabirds and short-tailed albatrosses ($100,000)
(R0323)

NOAA Alaska Fisheries Science Center. Identify extent of use of trawler sonar cables (third wires) and interactions with seabirds. Provide risk profiles to albatrosses and ways to reduce mortalities.

25. Studies of fishing communities in Alaska ($45,000)
(R0318)

EDAW, Inc. Produce a template for collection and analysis of community profile information for fishing communities in the North Pacific and use it to construct four key fishing community profiles. Information will be used in various socioeconomic analyses required under NEPA and MSA. Joint funding support from NPRB and NPFMC.

26. Video monitoring on factory trawlers ($165,000)
(R0325)

Digital Observer LLC, Kodiak. Will experiment with using video monitoring gear to develop a verifiable method of enumerating bycatch aboard factory trawlers. Assess suitability of information to supplement onboard fisheries observer data.

27. Health of Pacific herring ($68,198)
(R0319)

University of California. Study disease in Prince William Sound and Sitka Sound herring and the role of pigmented macrophage aggregates to determine relative effects of age, season and gender of herring.

(Note: Project numbers in parentheses may be used to learn more about each project at www.nprb.org under "Research.")

28. Thermal habitat preferences of Pribilof Island halibut ($92,920)
(R0314)

International Pacific Halibut Commission and Central Bering Sea Fishermen's Association. Will determine whether average sea bottom temperature and its temporal variability correlate with catch rates in the halibut fishery of St. Paul Island. Hope to explain what causes movement and distribution patterns of halibut in shallow coastal waters of Pribilofs and throughout western Alaska.

29. Supply and demand model for king crab and snow crab ($80,000)
(F0423)

University of Alaska Fairbanks. An international econometric model will be constructed, estimated and simulated to target the primary and most important determinants of demand, estimate the relationship between North America crab landings and the resulting prices and revenues received for the crab, and set a foundation and educate fishery managers and industry participants on market factors which affect price.

30. Spiny Dogfish off Alaska ($171,000)
(F0418)

University of Alaska Fairbanks and University of Washington. Will collect information on life history, ecology, population dynamics, and fisheries bycatch for spiny dogfish in Alaska.

31. Modeling multispecies groundfish interactions ($90,000)
(F0419)

NOAA Alaska Fisheries Science Center. Work will focus on the update and further development of the Multispecies Statistical Model. This approach will make available the tools used in single-species stock assessment in a multispecies context, providing probabilistic statements on the future state of some commercially important components of the ecosystem.

32. Young of the year Pacific ocean perch genetics ($105,000)
(F0420)

University of Alaska Fairbanks. Will compare the genetic compositions of previously collected young of the year Pacific ocean perch with adult geographic population genetic structure.

Marine Mammal Research: $953,000

33. Ecology of ice seals in the Bering-Chukchi Seas ($150,000)
(R0312)

Alaska Department of Fish and Game. Will develop monitoring program of population status of ringed, bearded, spotted, and ribbon seals in conjunction with annual subsistence seal harvest.

34. Feeding ecology and distribution of harbor seals in Prince William Sound ($172,886)
(R0313)

Alaska Department of Fish and Game and Simon Fraser University (BC). Will examine prey availability and predation risk to the population dynamics of harbor seals in Prince William Sound. Will also explore how alternative fisheries scenarios might influence foraging ecology and demography of seals.

(Note: Project numbers in parentheses may be used to learn more about each project at www.nprb.org under "Research.")

35. Bering Sea wintering grounds of beluga whales ($161,700)
(R0324)

NOAA National Marine Mammal Laboratory. Will conduct field work in several small bays and inlets on Chukotsk Peninsula and attach satellite transmitters to indicate winter movements and diving behavior. Biopsies will be used for genetic stock identification and to determine diet and contaminant load. Will identify beluga stocks that are vulnerable to harvest in Russian as well as U.S. and Canadian waters.

36. Bering Sea right whale distribution ($56,117)
(R0307)

Scripps Institute of Oceanography. Will continue processing acoustic data from SE Bering Sea and combine with other data to characterize baleen whale abundance, distribution, calling behavior, and habitat preferences.

37. Dietary specialization of Bering Sea and Aleutian Islands killer whales ($168,000)
(F0411)

NOAA National Marine Mammal Laboratory and Northwest Fisheries Science Center, and University of Alaska Fairbanks. Will investigate the dietary specialization of killer whales in the BSAI region through the use of stable isotope and fatty acid analysis.

38. Fur seal foraging strategies and consequences ($244,000)
(F0414)

NOAA National Marine Mammal Laboratory and University of Alaska Fairbanks. Will compare consequences of foraging in different habitats of the Bering Sea (Pribilofs vs. Bogoslof) in summer versus that of winter foraging in the North Pacific.

Marine Food Web Ecological Studies: $3.58 million

39. Monitoring of biophysical moorings in the Bering Sea ($120,690)
(R0203)

NOAA Pacific Marine Environmental Laboratory and Alaska Fisheries Science Center and University of Alaska Fairbanks. This study continues the long-term monitoring of ocean and biological variables at biophysical moorings 2 and 4 on the Bering Sea shelf to lay the foundation for a knowledgeable forecast of how future changes in the climate may impact this ecosystem, its living marine resources and protected marine species.

40. Monitoring of biophysical moorings in the Bering Sea ($320,000)
(R0315)

NOAA Pacific Marine Environmental Laboratory and University of Alaska Fairbanks. Will continue two years of monitoring of physical and biological environment of the southeastern Bering Sea. This will provide essential information during this period of change in the North Pacific and elucidate how the marine ecosystem is changing. This is a continuation of project R0203.

41. Monitoring of biophysical moorings in the Bering Sea ($170,204)
(F0410)

NOAA Pacific Marine Environmental Laboratory and Alaska Fisheries Science Center and University of Alaska Fairbanks. Will continue one year of monitoring of physical and biological environment of the southeaster Bering Sea. This is a continuation of projects R0203 and R0315.

(Note: Project numbers in parentheses may be used to learn more about each project at www.nprb.org under "Research.")

42. Plankton surveys across the North Pacific ($180,000)
(R0302)

Sir Alister Hardy Foundation for Ocean Science and DFO-Canada. Will sample plankton using ships of opportunity crossing the North Pacific and characterize associated environmental conditions. Will enhance interpretation of plankton, marine bird and mammal data and improve understanding of marine ecosystem.

43. Marine bird/mammal observations and continuous plankton recorder program ($60,009)
(R0206)

Pt. Reyes Bird Observatory Conservation Science. Augment and enhance the existing continuous plankton recording program on ships of opportunity to conduct observations of marine mammals and seabirds along the CPR survey lines. Related to R0302.

44. Marine bird/mammal observations and continuous plankton recorder program ($255,690)
(F0409)

Pt. Reyes Bird Observatory Conservation Science and Duke University Marine Laboratory. Will continue two years of integrated marine birds, mammals and plankton monitoring program in order to assess yearly variability in seabird and marine mammal distributions relative to CPR derived plankton communities, temperature and chlorophyll. Continuation of R0206.

45. Detecting change in the Bering Sea ecosystem ($124,084)
(R0207)

NOAA Pacific Marine Environmental Laboratory and Alaska Fisheries Science Center. Develop measures of ecosystem status for the Bering Sea based on retrospective data and design a protocol that will test the hypothesis that the effects of environmental change in the Bering Sea often occur from single strong forcing events in the atmosphere and ocean, which lead to an ecosystem reorganization that persists for many years.

46. Nutritional quality of Alaskan fish for predators ($24,782)
(R0210)

University of Alaska Fairbanks. Funding will support purchase and set-up of equipment to measure the caloric density of fish and other prey items to enhance understanding of trophic dynamics and predator-prey relationships.

47. Sinking particles/pelagic food webs in the SE Bering Sea ($21,661)
(R0211)

University of Alaska Fairbanks. Supports the continued monitoring of zooplankton in the Bering Sea by using sediment traps on biophysical moorings 2 and 4 on the Bering Sea shelf. Related to R0203.

48. Seabird studies on kittiwakes, murres, auklets, and short-tailed albatross ($900,000)
(R0320)

University of Alaska Fairbanks. Will study feeding ecology of seabirds in southeastern Bering Sea, Pribilofs and Aleutians to determine food availability and stress patterns. Will provide insight on relationships between climate and food web dynamics and a better understanding of how the marine ecosystem may change in response to long-term climate changes and global warming.

(Note: Project numbers in parentheses may be used to learn more about each project at www.nprb.org under "Research.")

49. Forage fish studies near Kodiak ($320,000)
(R0308)

NOAA Alaska Fisheries Science Center. Will determine relationship of zooplankton prey and forage fishes in western Gulf of Alaska near Kodiak and how winter conditions influence the prey field and feeding opportunities for juvenile Pollock.

50. Forage fish assessment to support integrated BSAI ecosystem study ($500,000)
(F0401)

NOAA Alaska Fisheries Science Center and Environmental Technology Laboratory, University of Alaska Fairbanks, University of Washington, and Louisiana State University. Will assess abundance, distribution, diet, and condition of forage fish species and their prey, by assessing abundance, examining food web relationships, testing a potential monitoring program, using underwater acoustics, and airborne visual and remote sensing of a nearshore section from Dutch Harbor to Port Moller.

51. Ocean circulation models ($75,000)
(F0402)

University of Alaska Fairbanks and NOAA Pacific Marine Environmental Laboratory. Will convene a workshop on the present state of ocean circulation modeling for the Bering Sea and Aleutian Island (BSAI) region of the North Pacific.

52. Kelp-grazer interactions ($188,963)
(F0407)

University of Alaska Fairbanks. Will study kelp-grazer interactions with emphasis on grazing activity, significance of chemical defenses and resource allocation strategies in dominant kelp species in Kachemak Bay.

53. Bering Sea variability and coupling ($191,158)
(F0408)

Old Dominion University Research Foundation (Norfolk, VA). Will utilize co-registered satellite imagery from multiple sensors to examine temporal and spatial variability of environmental parameters throughout the Bering Sea and to evaluate the response of phytoplankton to locally variable forcing.

54. Tufted Puffins as bioindicators ($131,476)
(F0413)

University of Alaska Fairbanks. Will utilize quantitative fatty acid signature analysis and stable isotope analysis to estimate the diets of tufted puffins breeding in Chiniak Bay, Kodiak, Alaska.

Education and Outreach and Synthesis Information: $623,000

55. Support participation in the Alaska Regional National Ocean Sciences Bowl ($100,000)
(R0326)

Alaska Sea Grant at University of Alaska Fairbanks. Will provide travel funds for participating teams from Alaska communities off the road system and support regional workshops with interested rural teachers and students. Alaska Regional National Ocean Sciences Bowl provides for public involvement in marine resource issues and in capacity building for dealing with those issues in rural communities.

(Note: Project numbers in parentheses may be used to learn more about each project at www.nprb.org under "Research.")

56. NPRB education and outreach ($103,000)
(F0403)

Alaska SeaLife Center. Will disseminate information on the Board's marine research priorities, projects and results through a variety of venues and media.

57. Alaska Marine Information System ($150,000)
(F0404)

University of California, San Diego and System Science Applications. Will develop a system for access to and long term data archive of marine data for Alaska and the North Pacific Ocean, Bering Sea and Arctic Ocean.

58. Arctic Ocean information synthesis ($150,000)
(F0405)

LGL Ecological Research Associates, Inc. (Texas) and URS Alaska Operations. Will prepare an integrated synthesis of the biological and oceanographic information available on the Beaufort and Chukchi Seas, including Russian research.

59. Southeast Alaska synthesis ($120,000)
(F0406)

University of Alaska Southeast. Will organize a workshop in which experts in marine biology and oceanography of Southeast Alaska will present syntheses of the progress made in specific areas, including biological, physical, and chemical oceanography, climatic forcing, and the temporal and spatial variability in a variety of marine populations with different life histories, including fished species.

Contaminants: $157,000

60. PBDE levels in estuarine ecosystems ($48,402)
(F0421)

University of Alaska Southeast. Will identify and quantify polybrominated biphenyl ethers (flame retardant derivatives) in sediment and tissue samples of organisms inhabiting estuarine habitats near a landfill in Southeast Alaska and compare them to samples obtained from a more pristine estuarine habitat.

61. Hydrocarbons in Nelson Lagoon ($108,820)
(F0422)

Anchorage Fish and Wildlife Field Office. Will monitor hydrocarbon contamination using passive water sampling devices and blue mussels as bioindicators to establish baseline measurements of petroleum contaminants in Nelson Lagoon.

(Note: Project numbers in parentheses may be used to learn more about each project at www.nprb.org under "Research.")

Public Testimony Sign-Up Sheet

and

Other Handouts Received

PUBLIC TESTIMONY SIGN-UP SHEET FOR AGENDA ITEM ~~5a(1)~~ B- Reports

	NAME (PLEASE PRINT)	AFFILIATION
1		
2	Dick Miller (declined comment)	Controller Bay J.V 3
3		
4	Paul-MacGregor	At-Sea Processors Assn 6
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NOTE to persons providing oral or written testimony to the Council: Section 307(1)(I) of the Magnuson-Stevens Fishery Conservation and Management Act prohibits any person " to knowingly and willfully submit to a Council, the Secretary, or the Governor of a State false information (including, but not limited to, false information regarding the capacity and extent to which a United State fish processor, on an annual basis, will process a portion of the optimum yield of a fishery that will be harvested by fishing vessels of the United States) regarding any matter that the Council, Secretary, or Governor is considering in the course of carrying out this Act.