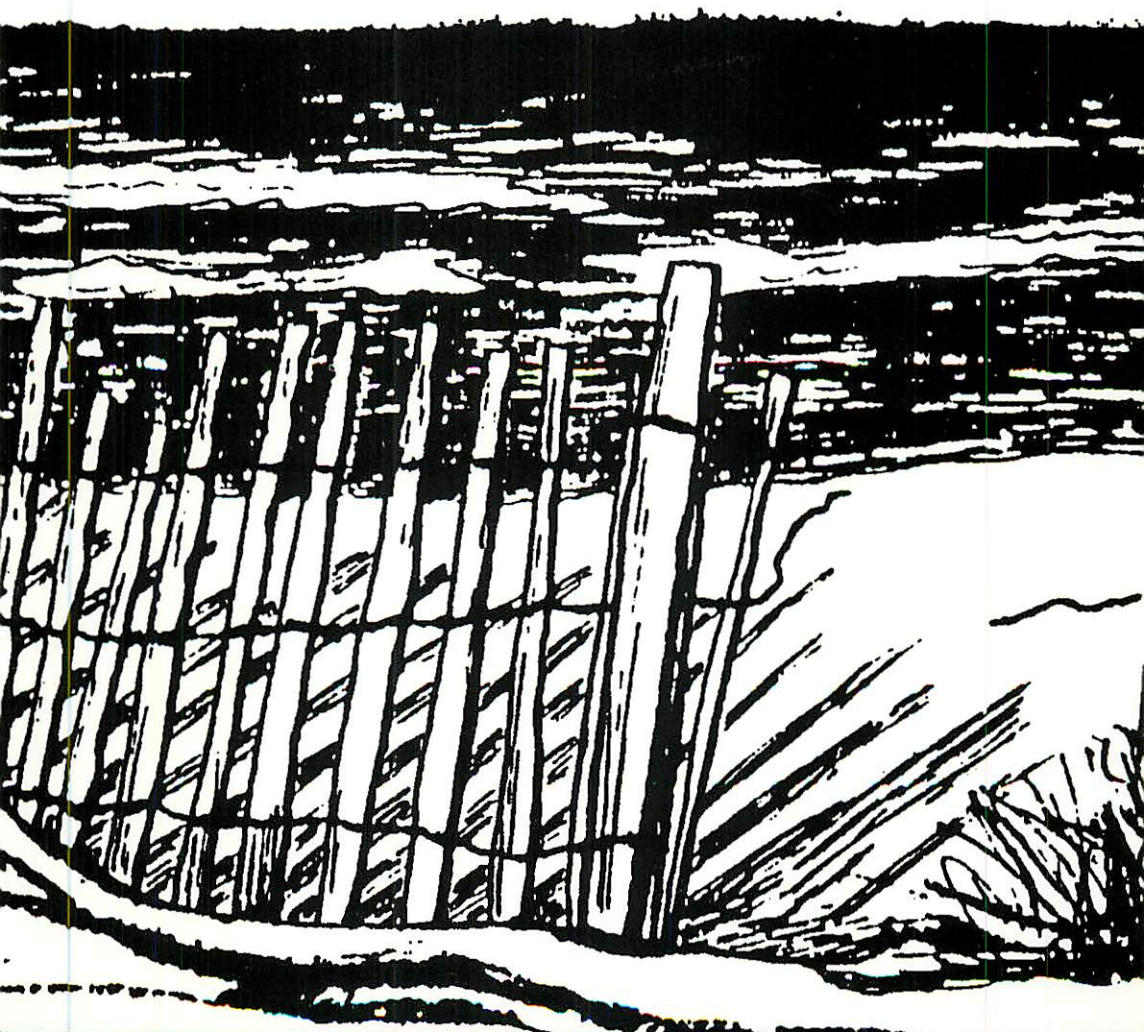




*A Review of NOAA
National Sea Grant
College Program*



NATIONAL RESEARCH COUNCIL

A Review of the NOAA National Sea Grant College Program

Committee to Review the NOAA National Sea Grant College Program

Ocean Studies Board

Commission on Geosciences, Environment, and Resources

National Research Council

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Preface

The National Sea Grant College Program (NSGCP) has existed since 1967, three years longer than the agency in which it presently resides, the National Oceanic and Atmospheric Administration (NOAA). NSGCP has provided an important mechanism over the years for NOAA to access the broad array of skills and talents in state and private universities, and has encouraged the linking of research, education, and outreach activities to focus on problems of practical, economic, and social significance. NSGCP continues to provide opportunities for NOAA to develop cost-effective means for investigating marine issues where sharing resources—human, facilities, and fiscal—advances the national interest. NSGCP is a major vehicle for NOAA to reach beyond its own corporate laboratories and to use the nation's expertise in marine science, engineering, policy, and education for the national good.

The Ocean Studies Board was requested to review NSGCP as part of the preparations for the upcoming reauthorization hearings to be held in 1994 and 1995. The Administrator of NOAA requested that this review be completed no later than June 1, 1994, and accordingly, the committee and the Ocean Studies Board staff made exceptional efforts to gather the available information quickly and to solicit views and opinions to ensure inclusion of a wide range of perspectives. The many detailed responses received by the committee were greatly appreciated and showed the depth and breadth of interest, enthusiasm, and profound concerns about and for NSGCP. This report summarizes those materials and makes a series of focused recommendations to specific individuals, including associated action dates. In this way, the committee believes it has given NOAA a plan that can be followed to ensure that the concerns and problems

identified are addressed before the reauthorization hearings. Too much is at stake to permit apathy or inflexibility to hamper the potential success of NSGCP.

I would like to thank the entire committee and the staff of the Ocean Studies Board, whose hard work made it possible to complete this report in under three months from inception to completion.

Arthur R.M. Nowell

14 April 1994

Contents

PREFACE	vii
EXECUTIVE SUMMARY	1
CHAPTER 1 - INTRODUCTION	7
History of Sea Grant, 7	
Background of the Study, 9	
Scope of the Study and Committee Composition, 9	
How the Study Was Conducted, 11	
Organization and Philosophy of the Report, 12	
CHAPTER 2 - ISSUES: BACKGROUND AND FINDINGS	13
Issue 1—Sea Grant’s Position Within NOAA, 13	
Issue 2—Shared Vision and Strategic Planning, 17	
Issue 3—Overlapping Roles and Responsibilities, 19	
Issue 4—Proposal Review and Program Evaluation, 22	
Issue 5—Interactions with Industry, 29	
Issue 6—Funding, 31	
CHAPTER 3 - RECOMMENDATIONS	37
Issue 1—Sea Grant’s Position Within NOAA, 37	
Issue 2—Shared Vision and Strategic Planning, 39	
Issue 3—Overlapping Roles and Responsibilities, 40	
Issue 4—Proposal Review and Program Evaluation, 42	

Issue 5—Interactions with Industry, 46

Issue 6—Funding, 47

APPENDICES

49

Appendix 1 - Excerpt from the National Sea Grant College
Program Act, 51

Appendix 2 - Letter of Request, 53

Appendix 3 - Committee Biographies, 54

Appendix 4 - Questionnaires, 57

Appendix 5 - Documents Reviewed, 61

Appendix 6 - Sea Grant Programs and Their Groupings, 63

Executive Summary

The National Sea Grant College Program (NSGCP) was created nearly 30 years ago and has matured into a state-federal partnership with unique roles and great potential for helping the United States address coastal issues of resource management, academia-industry interactions, environmental quality, and economic competitiveness. Sea Grant combines research, outreach, and education activities to approach these issues of importance to society and provides a great potential resource to its parent agency, the National Oceanic and Atmospheric Administration (NOAA).

The Under Secretary of Commerce for Oceans and Atmosphere requested that the National Research Council examine NSGCP as NOAA prepares for the reauthorization of the National Sea Grant College Program Act in 1995. A committee of diverse expertise was assembled to conduct the requested evaluation which was completed over a three-month period.

The committee agreed that NSGCP has played an important role in U.S. marine science, education, and outreach. The great potential of the program has not been achieved, however, because of fiscal limitations coupled with various organizational and management difficulties. The committee identified many problems and developed possible responses to mitigate these problems. From among these various issues, the committee identified six that it believes are the most important and made recommendations to address them.

ISSUE 1—SEA GRANT’S POSITION WITHIN NOAA

Finding: Sea Grant is not properly positioned within NOAA to fulfill the objective of the National Sea Grant College

Program Act¹ or to contribute in efficient and effective ways to NOAA's missions. Sea Grant's location within a Line Office focused on research inhibits Sea Grant's non-research activities and makes it difficult for the program to function across Line Office boundaries.

Sea Grant is one component of the NOAA Office of Oceanic and Atmospheric Research (OAR). Sea Grant's research, outreach, and education activities seem to be isolated from similar activities carried out within other Line Offices and cannot be integrated fully within the present NOAA structure. Sea Grant's strengths in certain subject areas, and its established network for interacting with states, contribute to activities outside OAR and could make a great contribution to all of NOAA, if appropriately located.

Recommendation: The Administrator must ensure that NSGCP has *appropriate* responsibility and capability for research, education, and outreach across NOAA. NSGCP should be relocated within NOAA to report directly to the Office of the Administrator.

ISSUE 2—SHARED VISION AND STRATEGIC PLANNING

Finding: To date, Sea Grant has not developed a strategic plan to articulate a shared vision of its future and specify how it integrates its programs to achieve a set of appropriate goals. The lack of a shared vision, common to all Sea Grant partners, for what Sea Grant is and should become, may have hindered its operations and decreased its visibility and utility within NOAA.

Although different participants in the Sea Grant system are engaged in strategic planning, there was no evidence that these activities would yield a unified product that would integrate state and NOAA endeavors and priorities. New initiatives and ongoing research themes are not presently rationalized into an integrated set of activities for which Sea Grant is uniquely qualified.

Recommendation: State Sea Grant directors and the Director of the National Sea Grant Office (NSGO) must cooperate to develop a single strategic plan articulating a shared vision and strategies which must be fully integrated into, and reflective of, NOAA's strategic plan. Unified Sea Grant strategic planning should begin immediately so that its results can be incorporated in the FY1997 NOAA budget.

¹ See Appendix 1 for excerpt from the National Sea Grant College Program Act.

ISSUE 3—OVERLAPPING ROLES AND RESPONSIBILITIES

Finding: Management advice by NSGO is inadequate, NSGO and the state programs duplicate proposal review (Issue 4) and strategic planning (Issue 2), and the Sea Grant Review Panel (SGRP) has initiated activities that should have been undertaken by NSGO.

State programs and NSGO conflict in proposal review and incipient strategic planning activities and there does not appear to be a carefully designed division of responsibilities that reflects what each participant in the Sea Grant system might do best. Present roles are more a product of history than of thoughtful design or effective management. More detail on roles in strategic planning and proposal review are given in issues 2 and 4, respectively. Sea Grant could capitalize on its strengths and fill an empty niche by making regional activities a major priority.

Recommendation: The roles and responsibilities of the state Sea Grant directors, NSGO, and SGRP must be clarified. The resultant roles and responsibilities of NSGO and SGRP should be clarified by the NOAA Administrator prior to the 1995 reauthorization.

ISSUE 4—PROPOSAL REVIEW AND PROGRAM EVALUATION

Finding: The Sea Grant process for reviewing research proposals and for processing grants is slow compared with other federal agencies and is not standardized at the state level. There is redundancy in proposal review between the state and national levels. The process is further complicated by being coupled to the overall program evaluation process.

At present, state programs conduct review processes of their own designs for individual proposals, followed by an additional review carried out by NSGO. The structure of this process slows the review so that it is impossible to complete in a single year. The coupled proposal review-program evaluation is not designed to serve either purpose well and results in high administrative costs for the Sea Grant program.

Recommendation: The review process for research proposals should be decoupled from the NSGO evaluation of state programs prior to the 1995 reauthorization. Standard scientific and peer review procedures should be implemented for all state Sea Grant programs. The review process and all

aspects of program implementation, including administration, should be streamlined prior to FY1996. NSGO should evaluate the success of each state program on a four-year cycle, using, in part, retrospective information on recent achievements, based on measures for each of the three areas of research, education, and outreach. SGRP should evaluate the performance of NSGO on the same timetable.

ISSUE 5—INTERACTIONS WITH INDUSTRY

Finding: The mutually beneficial opportunities of university-industry cooperation envisioned by Sea Grant program founders have not been realized.

State programs and NSGO interact with industry through a variety of mechanisms, including industry advisory groups, the Sea Grant Marine Advisory Service, and a limited number of applied research projects. These interactions are tightly focused, limited primarily to small companies, and are not a significant source of Sea Grant funding.

Recommendation: NSGO and the state Sea Grant programs must increase their interactions with marine industry to include program policy guidance, expanded outreach and marine advisory services, joint research projects, and substantial industry financial support of the Sea Grant program. Action to address this recommendation should form part of the examination of the performance of each state program. These actions should be identified in the Sea Grant strategic plan.

ISSUE 6—FUNDING

Finding: Level funding, growth in the number of participating state programs, inflation, and increased NSGO administrative costs have severely eroded the real purchasing power of NSGCP since its inception and are preventing the program from providing its full potential contribution to the nation.

Funding data examined by the committee showed that Sea Grant fiscal resources have decreased in purchasing power over time, yet are still spread over the same broad program areas. The committee concluded that Sea Grant has not been able to capitalize on many opportunities in areas where the program has proven its abilities, because of a lack of fiscal resources.

Recommendation: The committee agreed that NSGCP needs additional funding to fulfill its potential. In the last decade, the purchasing power of the average research grant has declined by about one-half. A steady increase in funding is necessary if the program's potential contributions to the nation's economic and environmental health are to be realized. Any additional funds appropriated to NSGCP should be split between enhancement of meritorious state programs and support of new initiatives.

All six of the recommendations above must be implemented in order to improve Sea Grant's performance. Rapid implementation of these recommendations would help Sea Grant more efficiently manage its responsibilities and more wisely use any additional funds provided by Congress. If necessary improvements are not made, the committee suggests that Congress consider changes in the Sea Grant program and authorizing legislation. Congress might consider an alternate location for the Sea Grant program in order to ensure that the nation's marine science objectives are met.

Introduction

HISTORY OF SEA GRANT

Sea Grant was created by the National Sea Grant College Program Act of 1966 as a marine analog to the Land-Grant College System. Sea Grant was originally placed in the National Science Foundation, which set up a National Sea Grant Office (NSGO) in 1967 and awarded its first grants in 1968. In 1970, Sea Grant was incorporated into the new National Oceanic and Atmospheric Administration (NOAA) with other programs focused on the coastal zone and ocean. The first four Sea Grant Colleges were designated in 1971; today there are 26 Sea Grant Colleges and 3 institutions in the National Sea Grant College Program (NSGCP).

The program steadily received increasing funding until FY1981 (Figure 1).¹ From FY1984 to FY1990, Sea Grant was not included in the President's budget, but was restored by Congress each year. In FY1991 and FY1992, the administration budgeted about \$26 million for the program; again, Congress restored the program to level funding of about \$40 million. One legacy of these differences in priority between past administrations and Congress is political structures, re-

¹ Figures 1, 2, 4, and 10 were derived from figures that appeared in: National Association of State Universities and Land-Grant Colleges. 1983. *The National Sea Grant College Program*. A white paper prepared by the NASULGC Board on Oceans and Atmosphere, Washington, D.C. These figures are reproduced with permission from the National Association of State Universities and Land-Grant Colleges. Information for all other figures was provided by the National Sea Grant Office and state program directors.

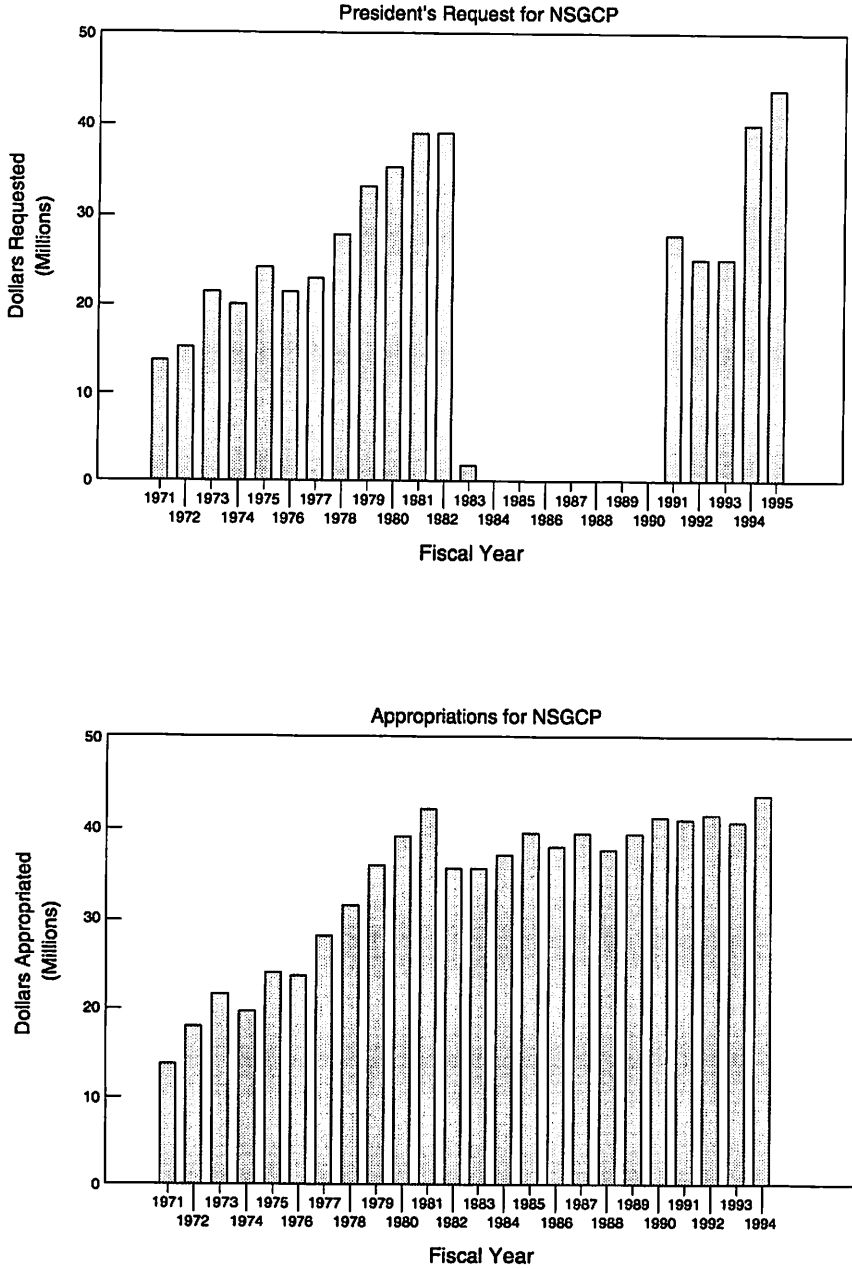


FIGURE 1 Administration funding requests and congressional appropriations for the National Sea Grant College Program from FY1971 to FY1995 (the FY1995 Congressional appropriation has not been determined).

lated to state Sea Grant programs, designed to ensure the survival of the program. The FY1994 budget reached a level of \$43.2 million, with \$3.2 million devoted to marine biotechnology and an additional \$2.8 million devoted to zebra mussel work. Although the program has maintained essentially level funding in current dollars over the past decade, the effects of inflation have diminished the purchasing power of the program (Figure 2).

Through Sea Grant, NOAA takes part in a variety of marine and Great Lakes research, education, and outreach activities. Sea Grant has been virtually the only source of funding in the United States for activities in marine policy, and has been a major contributor for the fields of marine aquaculture, coastal and estuarine research, marine fisheries management, seafood safety, marine biotechnology, marine engineering, and marine technology development. Sea Grant combines research, education, and advisory services into coherent, horizontally and vertically integrated approaches for the solution of coastal environmental and commercial problems. It has supported students at all levels of the educational system and has been a major factor in educating a significant portion of marine and Great Lakes scientists who now hold research and policy positions across the United States. Sea Grant supports a unique mechanism for assessing user needs through its local Marine Advisory Service network.

BACKGROUND OF THE STUDY

This study was requested on November 29, 1993, by the Under Secretary of Commerce for Oceans and Atmosphere, Dr. D. James Baker, in preparation for Sea Grant's reauthorization hearings (Appendix 2). Under Secretary Baker requested that the committee report its findings to him by June 1, 1994, because although Sea Grant's existing authorization does not expire until October 1, 1995, congressional hearings are planned for the summer and fall of 1994 and NOAA desires to have ample time to review the recommendations of the committee and to plan for their implementation. The National Research Council approved the composition of the review committee on February 9, 1994, signaling the start of the study.

SCOPE OF THE STUDY AND COMMITTEE COMPOSITION

The charge for the study given in the letter of request was particularly broad, and the following statement of work was developed for the committee:

The Committee to Review the NOAA National Sea Grant College Program will conduct a review and evaluation of the NOAA National Sea Grant College Program for two purposes: to provide the basis for any needed changes in the program, and to provide the basis for NOAA working with Congress on Sea Grant's reauthorization. The review will recognize that Sea Grant is not just a basic ocean science research program; it is a broad, networked aquatic program

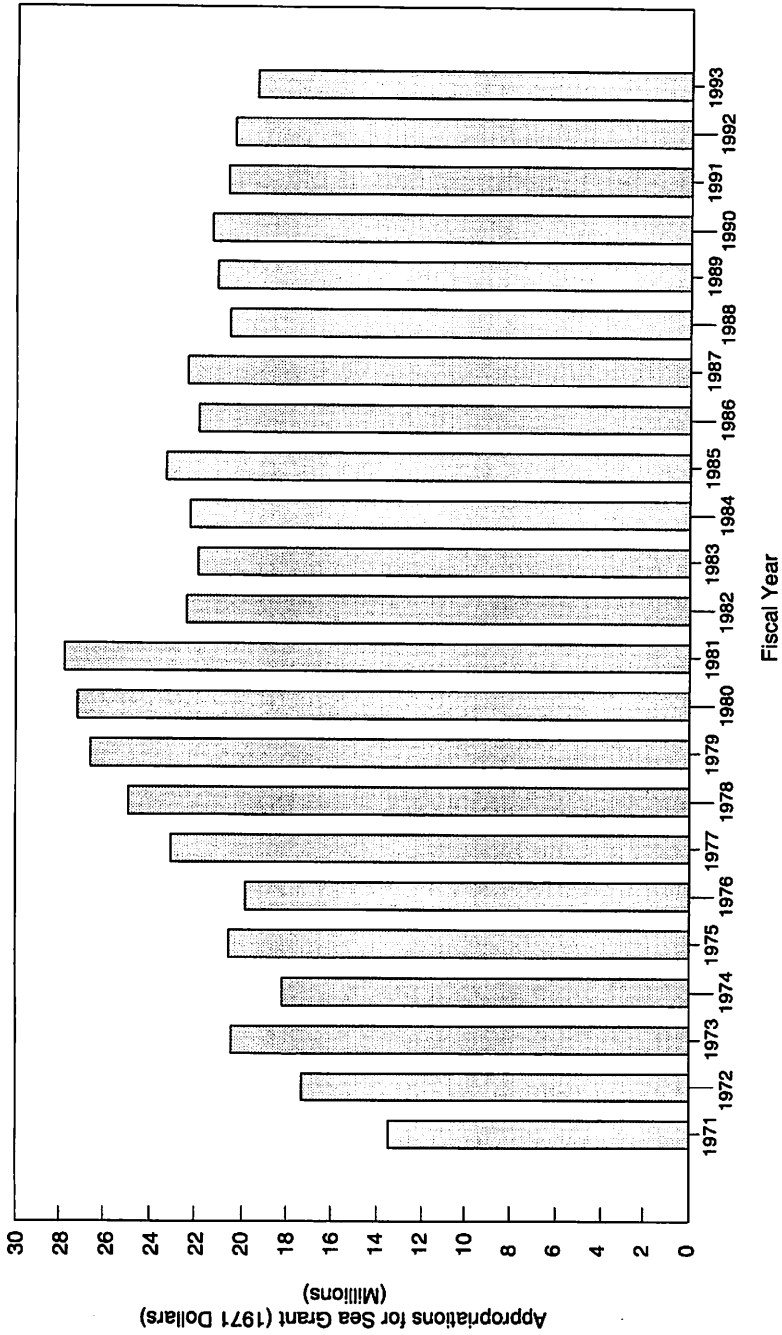


FIGURE 2 Congressional appropriations for the National Sea Grant College Program from FY 1971 to FY 1993, adjusted for inflation (1971 dollars).

designed to address issues and solve problems by combining sciences, social sciences, and the transfer of knowledge and technology.

The committee was formed to provide a balance among the disciplines that Sea Grant funds and between basic and applied science, to reflect the importance of state involvement, and to provide industry and outreach perspectives. Biographies of committee members are given in Appendix 3.

HOW THE STUDY WAS CONDUCTED

Because of the short time available for the study, the committee met in person twice and accomplished the rest of its work by electronic and mail communications. The committee sought input from many sources and evaluated questionnaire responses of state Sea Grant directors, industry representatives, and members of the National Association of Marine Laboratories (Appendix 4). The committee was briefed by participants from all parts of the Sea Grant system and written materials provided by them (Appendix 5) completed the information evaluated by the committee.

As noted above, NOAA requested that the study be conducted in a short period of time. To meet the time constraints, the committee concentrated on six issues that were identified consistently from background documents, from letters received from Sea Grant directors, industry representatives, and NAML member institutions, and from information presented at the committee's meetings. The committee did not evaluate the quality of individual research proposals or of advisory or education activities being carried out by state programs or by NSGO. Such reviews either are now under way within the organization or should be carried out with the appropriate scientific, technical, and relevancy considerations.

The committee's recommendations concern broad cross-cutting issues and are largely addressed to the Under Secretary of Commerce. The committee did not recommend changes in the National Sea Grant College Program Act; however, many changes are requested to be implemented before the 1995 reauthorization process is complete. NOAA should consider these recommendations as it seeks to ensure the future health of the program and to prepare for the reauthorization. The report notes a number of additional topics that NOAA or an appointed independent group should study in more depth in the future. Finally, the committee did not attempt to document the many accomplishments of NSGCP that were reported. This report focuses on areas of the program that need improvement, as requested by the Under Secretary.

The committee concentrated on national-level activities and did not investigate any state programs in detail. Thus, most of the recommendations and findings will concern NSGO; the committee does not wish to imply that many of the state programs would not benefit from changes in their procedures, management,

and focus. It was clear that there is great variability among the 29 programs and there is a shared responsibility among NSGO, Sea Grant institutions, and SGRP to work assiduously to not only achieve uniformity, but more importantly, to increase the average program-wide quality. The committee's recommendations aim to ensure not only an improvement within NOAA, but also an enhancement of the quality at the state level. It is the view of the committee that when such responsibility is recognized and shared, the original goals and current aspirations for the program will be achieved.

ORGANIZATION AND PHILOSOPHY OF THE REPORT

The following two chapters of the report present the critical issues and related findings identified by the committee (Chapter 2) and the recommendations that the committee developed to help Sea Grant and NOAA respond to these issues (Chapter 3). Following the major recommendations, additional subordinate recommendations are discussed.

The committee found that Sea Grant has played an important role in supporting high-quality strategic research of local and national significance and has transferred research results to the industrial and environmental communities. The committee recognized that the present emphasis on strategic research throughout government, which emphasizes links to societal problems and provides economic opportunities to industry, has been the operating philosophy of Sea Grant since its inception. Accordingly, the committee's recommendations suggest ways of improving an important program. It is the unanimous view of the committee that Sea Grant is too important to be allowed to founder. NOAA and the Department of Commerce (DOC) should either recognize Sea Grant's importance to the states and industry or risk the loss of a very visible program. The committee was informed of apathy and hostility toward Sea Grant from many within NOAA and DOC. The committee was surprised by these attitudes given the importance of state-federal partnerships and focused strategic research.

Issues: Background and Findings

A large number of issues were brought to the attention of the committee. Of these, six issues appeared to be of first order, which could be documented adequately in the time allowed for this review.

ISSUE 1 SEA GRANT'S POSITION WITHIN NOAA

The National Oceanic and Atmospheric Administration (NOAA) funds a large portion of U.S. applied aquatic research carried out in universities. Much of this support is provided through Sea Grant, which is the largest single extramural funding program within NOAA. The Sea Grant budget accounts for approximately 2.2% (\$43.2 million) of the FY1995 President's request for NOAA. Sea Grant has focused on strategic research, research that is targeted to solve coastal environmental problems and to stimulate coastal economies. This strategic research is coupled with education and advisory services to form integrated approaches to coastal issues. Sea Grant capabilities are implemented through the state-based Sea Grant programs that facilitate information flow into local communities and from communities and states to NOAA. State Sea Grant staff have developed broad networks of contacts with state and local agency personnel, legislators and their staff, and industry representatives. Most state programs focus on addressing state, and to a lesser extent regional, issues.

Sea Grant interacts within NOAA through contributing NSGO staff to OAR and NOAA-wide activities, through a series of memoranda of agreement, and by handling pass-through funding. The Coastal Ocean Program uses Sea Grant to

handle planning, review, and funding for its Estuarine Habitat Program and as a pass-through mechanism for most of its extramural funding.¹ Other parts of NOAA also use Sea Grant as a pass-through mechanism. In fact, pass-through funding (from NOAA and elsewhere) accounted for approximately 13% of funds handled by state programs in FY1993.

Although NSGO staff often participate in cross-NOAA activities, Sea Grant has funded few joint activities with units in other Line Offices because funds for joint NSGO-Line Office activities must be derived from within its capped administrative costs. There is little use of the capabilities of state Sea Grant programs in a wider NOAA context. Sea Grant could use its proven state-level capabilities more broadly within NOAA, but it was evident to the committee, state program directors, and the Sea Grant Review Panel (SGRP) that the program has not achieved its potential in this area. For example, many state program directors noted that NOAA has not adequately integrated Sea Grant with other parts of NOAA to use strengths and capabilities of Sea Grant. As an example of how Sea Grant could help NOAA, the Sea Grant Marine Advisory Service (MAS) "was the lead organization in stabilizing the conflict between NOAA's National Marine Fisheries Service and the shrimp industry regarding the use of turtle excluder devices (TEDs). All [state Sea Grant] programs along the Southeast and Gulf coasts have contributed to development of certification procedures and new TED models, which in turn contributed to decreased anxiety on both sides."² More generally, many different programs in NOAA have developed their own schemes for accomplishing strategic research, outreach, and education. None of the research, outreach, and education activities carried out elsewhere in NOAA has such a well-developed network of state programs or devotes as many of its resources to outreach and education focused on strategic research issues, as does Sea Grant.

It is not clear why Sea Grant's capabilities have not been used throughout NOAA, although it may be because Sea Grant accounts for only a minor part of the NOAA budget and operates primarily in the states. It is relatively invisible within NOAA at the national level. Sea Grant is administered as a part of NOAA located in the Office of Oceanic and Atmospheric Research (OAR) (Figure 3). As a result of Sea Grant's low-level placement, subsumed within a program in a Line Office, the capabilities of state Sea Grant programs have little impact on other NOAA activities.

Sea Grant was not included in the President's budget for eight years, in part, because it was viewed as a Congressional program of aid to states of unrecognized usefulness to NOAA and to the Department of Commerce (DOC). During

¹ National Research Council. 1994. *A Review of the Accomplishments and Plans of the NOAA Coastal Ocean Program (1994)*. National Academy Press, Washington, D.C.

² National Sea Grant College Program. 1993. *Sea Grant Review 1990 through 1992*. National Oceanic and Atmospheric Administration, Department of Commerce, Washington, D.C.

National Oceanic and Atmospheric Administration

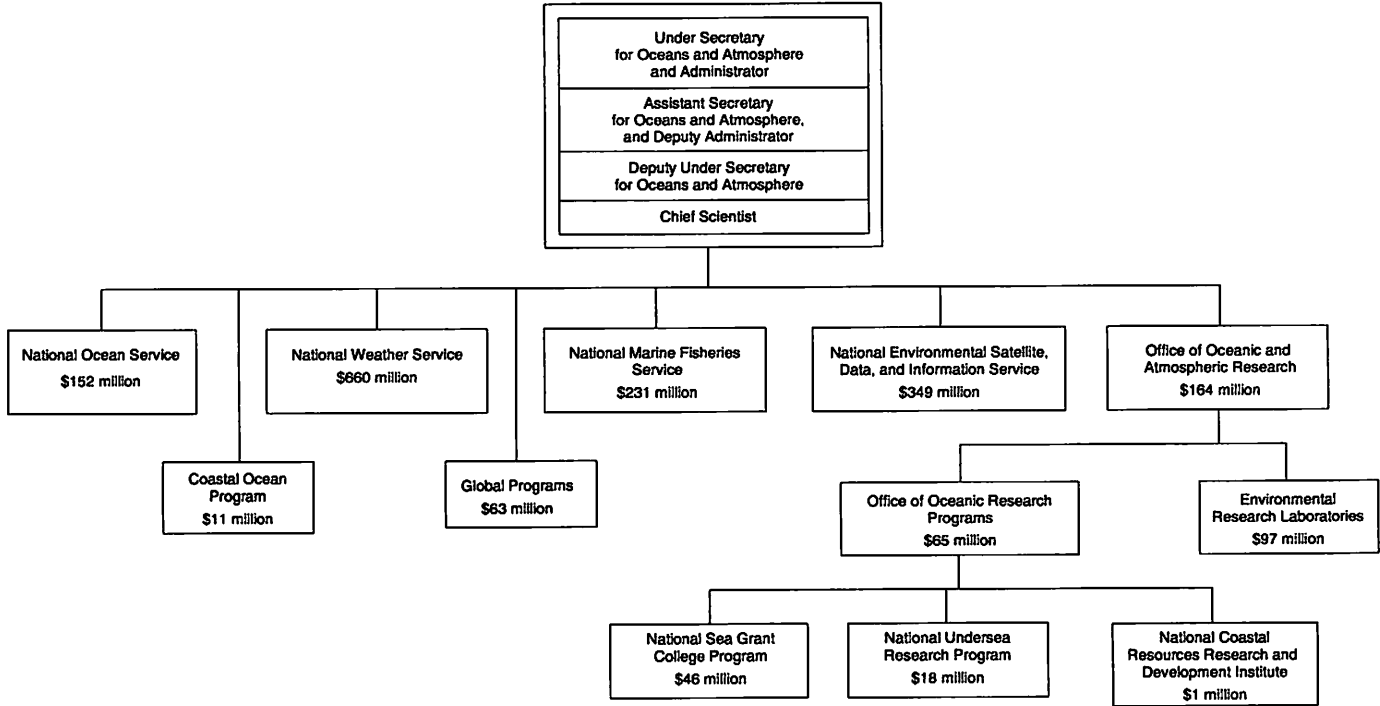


FIGURE 3 NOAA organizational chart with FY 1994 budget allocations.

this time, Sea Grant was unable to take part in many budget initiatives and the underlying planning exercises within NOAA. Sea Grant's present position in the NOAA hierarchy makes it difficult for it to function across NOAA and it has insufficient authority and financial leverage to overcome bureaucratic barriers within NOAA.

NOAA and DOC have missed opportunities that Sea Grant could provide; for example, DOC did not propose budget increases to increase Sea Grant's role in the marine biotechnology initiative of the Federal Coordinating Council for Science, Engineering, and Technology.³ Although Sea Grant could have been a working model for strategic research planned and carried out by state-university partnerships, DOC has chosen to reinvent such mechanisms through the National Institute for Standards and Technology (NIST). This may be a reflection of Sea Grant's relative invisibility within NOAA and DOC.

It would benefit NOAA to apply Sea Grant's capabilities throughout NOAA. Although Sea Grant is a component of OAR, many of Sea Grant's responsibilities and capabilities suit it for a role outside OAR and the Line Office structure. Sea Grant, if properly positioned within NOAA, could provide NOAA with early recognition of opportunities that cut across Line Office missions. Sea Grant must receive the attention from upper NOAA management appropriate for an organization that can provide cross-NOAA capabilities and opportunities for cooperation between states and the federal government and between universities and industry.

It is unlikely that Sea Grant capabilities can be applied throughout NOAA unless the constraints discussed above are removed. To function effectively, Sea Grant must interact with, but be administratively and fiscally insulated from, the Line Offices. The decentralized Sea Grant structure provides NOAA the opportunity to operate at a state level and to tailor its programs to the needs of each individual state. In many states, Sea Grant personnel have formed strong ties with local coastal management personnel and with local and regional NOAA personnel. NOAA could better use Sea Grant to disseminate and gather information in the coastal states. To have its full impact, Sea Grant must be repositioned in the NOAA structure. NOAA has encouraged cooperative Line Office activities on important topics by initiating programs that operate outside the Line Offices, for example, the Climate and Global Change Program and the Coastal Ocean Program. These programs use a variety of mechanisms to promote interactions among the Line Offices to achieve program goals, including "councils" of the assistant administrators and control of funding dedicated to joint activities. Interactions are also promoted by these two programs through funding of activi-

³ National Association of State Universities and Land-Grant Colleges. 1993. *The National Sea Grant College Program*. A white paper prepared by the Board on Oceans and Atmosphere, Commission on Food, Environment, and Renewable Resources. Washington, D.C., p. 7.

ties that combine the strengths of NOAA and academic investigators. These programs could be models for a repositioned Sea Grant program.

Finding: Sea Grant is not properly positioned within NOAA to fulfill the objective of the National Sea Grant College Program Act⁴ or to contribute in efficient and effective ways to NOAA's missions. Sea Grant's location within a Line Office focused on research inhibits Sea Grant's non-research activities and makes it difficult for the program to function across Line Office boundaries.

ISSUE 2 SHARED VISION AND STRATEGIC PLANNING

An organization uses strategic planning to gain consensus about its identity, to articulate its vision for the future, and to determine the best strategies and priorities for reaching the vision, taking into account existing economic and social conditions. Strategic plans are useful for building consensus among disparate participants and for providing a framework to determine if existing and proposed activities contribute to the organization's most important goals or if the activities are tangential. Strategic plans can help organizations that are involved in a broad range of activities, such as Sea Grant, to focus on those activities that are most important and for which they have strong capabilities, and to ensure that they are not involved in activities that would be carried out better elsewhere.

Sea Grant has been advised and even required to develop a strategic plan. For example, Section 206 of Public Law 100-220 (passed in 1987) states that:

Within 1 year after the effective date of the Marine Science, Technology, and Policy Development Act of 1987, and every 3 years after that date, the Under Secretary shall develop and publish in the Federal Register, a Sea Grant Strategic Research plan for the next 3 years.

The section then details what the plan shall do, to whom it should be submitted, criteria for areas to be included in the plan, and who should participate in its development. Section 206 was subsequently repealed but, according to NSGO, resulted in two documents that describe OAR's plans for its research programs.⁵

SGRP has a Long Range Planning Committee whose interest is to help NSGO with strategic planning. This panel has written a position paper (#2) on

⁴ See Appendix 1 for excerpt from the National Sea Grant College Program Act.

⁵ Office of Oceanic and Atmospheric Research. 1988. *Ocean System Studies. NOAA/OAR Research Strategy I. The Ocean System—Prediction and Resources*. National Oceanic and Atmospheric Administration, Washington, D.C. 80 pp.; and Office of Oceanic and Atmospheric Research 1988. *Ocean System Studies. NOAA/OAR Research Strategy II. The Ocean System—Use and Protection*. National Oceanic and Atmospheric Administration, Washington, D.C. 79 pp.

strategic management and made the following recommendation at its June 1992 meeting:

It is moved that the Sea Grant Director undertake strategic planning as a method of setting general priorities and directions and long range planning guidelines for Sea Grant that will provide a framework for decision making and guiding the future direction of Sea Grant; that such planning include as an inherent feature the flexibility to capitalize on the creativity of the academic community and to meet the unpredictable threats and opportunities that will surely arise; and that the Review Panel take an active role in advising the Director and his staff in this work.

Recommendations from SGRP, that Sea Grant should develop a strategic plan, have elicited a response from at least two entities in the Sea Grant system. At its February 24-26 meeting, the committee was told by NSGO and the Council of Sea Grant Directors (CSGD) that each is working on a strategic plan for Sea Grant and that the results would be reconciled when the respective plans are completed. It was evident that these activities were proceeding essentially independently and without a shared vision at the most basic level of program philosophy and administrative responsibility.

The draft NOAA strategic plan⁶ integrates Line Office activities by themes. Because of this structure, neither Sea Grant nor other NOAA units are prominent in the plan. The FY1995 NOAA budget (based on its strategic plan) specifies Sea Grant budget requests among NOAA themes. Sea Grant activities are listed as part of only five of the ten themes: (1) Advance Short-term Forecasts and Warnings, (2) Build Sustainable U.S. Fisheries, (3) Coastal Ecosystems Health, (4) Education and Human Resources, and (5) Environmental Technology. The committee believes that this underestimates the potential contributions of Sea Grant to NOAA. NOAA should reexamine its strategic plan to ensure that the capabilities of Sea Grant to contribute to NOAA's identified missions are utilized fully.

A Sea Grant strategic plan must take into account strategic planning that is being conducted at the state level as well as at the NOAA level. Sea Grant programs in several states carry on their own strategic planning activities; for example, directors from the New Hampshire/Maine, North Carolina, New York, and Rhode Island programs, among others, mentioned strategic planning as a component of their state program development. The Sea Grant strategic planning process must result in a vision shared by all Sea Grant partners, including NSGO, CSGD, the individual state programs, SGRP, and the Sea Grant Association (SGA; a non-profit association supported with private funds from Sea Grant colleges).

⁶ National Oceanic and Atmospheric Administration. 1993. *Strategic Plan, 1995-2005*. Department of Commerce, Washington, D.C.

The network of state programs developed a document entitled *Economic Competitiveness and the Coastal Environment*, which describes what Sea Grant does to benefit coastal business and suggests some future activities. This document will form the basis of a new funding initiative sometime in the next few years. Such existing initiatives should be included in the strategic plan, and new initiatives should result from the strategic planning process.

Finding: To date, Sea Grant has not developed a strategic plan to articulate a shared vision of its future and specify how it integrates its programs to achieve a set of appropriate goals. The lack of a shared vision, common to all Sea Grant partners, for what Sea Grant is and should become, may have hindered its operations and decreased its visibility and utility within NOAA.

ISSUE 3 OVERLAPPING ROLES AND RESPONSIBILITIES

The Sea Grant program has a dual nature, being a national program but one that is primarily conducted in the states by individual state programs, with the average contribution from the states ranging from 40 to 47% over the past 11 years. An important but difficult task is to balance the needs and prerogatives of the individual state programs with the regional and national needs and prerogatives of the Sea Grant system. At present, the magnitude of the tension among the Sea Grant partners, in particular between NSGO and the state directors, is counterproductive to the goals and objectives of Sea Grant. The committee chose to limit its consideration to the three entities that have roles and responsibilities set by statute or by agency regulations: NSGO, SGRP, and state programs. Hence, it did not consider the roles, value, or responsibilities of CSGD or SGA.

National Sea Grant Office

NSGO has guided the activities of the program in five ways, through: (1) the annual guidance document; (2) the manual of procedures (the "green book"); (3) its program monitor and subject area specialist reviews of individual proposals in institutional submissions; (4) the biennial allocation of funds among the state programs; and (5) the state program recertification process. State program directors did not find much of the guidance provided by these mechanisms to be helpful. For example, the green book "provides weak programmatic guidance, it is unevenly produced, largely uninformative, and does little to redress the problem of image, uniformity, and accountability of the program." The annual program guidance "seems diffuse and has been accused of pandering to the latest NOAA fad." "National guidance is wholly inadequate and lacks vision."

NSGO carries out its activities with a staff of 27 full-time employees (FTEs), and a budget of \$43.2 million (\$1.6 million/FTE). The administrative portion of the NSGO is capped under existing legislation (33 U.S.C. 1231). For purposes of comparison, basic research funded by the Office of Naval Research (ONR) is administered with an annual budget of \$417 million with a staff of 192 (\$2.2 million/FTE), and the National Science Foundation (NSF) Ocean Sciences Division administers a research budget of \$96 million (in FY1993) with a staff of 22 (\$4.4 million/FTE). It is difficult to make a direct comparison among these three agencies because of two offsetting factors. NSGO has responsibilities in addition to proposal processing and, conversely, state administrative costs are not included in this figure. The cap on NSGO administrative costs was introduced in 1991 because they rose faster than overall program funding during the period from FY1984 to FY1989.⁷ As administrative costs rose, NSGO eventually reduced or eliminated funding for rotators⁸, regional and international programs, and SGRP activities.

The range of roles and responsibilities currently undertaken by NSGO may not best reflect the resources and constraints of the office. NSGO has been relatively successful in including NOAA priorities in its guidance to state programs, but less successful in representing individual and collective state program needs and interests to NOAA. The committee recommends a revised proposal review process (Recommendation 4) that will eliminate the redundant scientific review of proposals at NSGO. Implementation of this recommendation will require Sea Grant to reassign its subject area specialists.

State Programs

The vast majority of the activity of the Sea Grant program takes place at the state level, through the individual state programs. State programs are managed by directors who spend 25 to 100% of their official time managing their programs. Most directors have earned Ph.D.'s, and the average tenure of service is eight years. State programs compete with each other for federal funds within four separate subgroups, staggered over a two-year period (see Appendix 6). The individual programs have effective constituencies within their states, as evidenced by the strong congressional support for Sea Grant in general and by the significant dollar match provided by many states through direct appropriations.

Although they are the driving force in the Sea Grant program, the individual

⁷ Presentation to committee by Chris Mann, staff of the House Merchant Marine and Fisheries Committee.

⁸ Rotators are temporary staff members assigned to an agency to bring outside perspectives to the agency. The Office of Naval Research and the National Science Foundation commonly host scientists from academic institutions as rotators for two-year terms.

state programs vary in size, organization, character, and quality. The Sea Grant system must be structured to deal with these variations. The committee had neither the time nor the information to examine these variations, but recognized that the quality, management, and the balance of state versus federal priorities must be evaluated for each state program.

Many research priorities lend themselves well to regional funding and coordination. At present, regional coordination of the various Sea Grant state programs consists primarily of bilateral activities between two adjacent states. NSGO provided funding in the early 1980s to help initiate regional programs, but either has not been able to continue such funding given other fiscal demands on the program or has assigned a lower priority to this enterprise. The various regional programs still operate, although the committee did not receive much information about their activities. There have been a number of successes from the regional structure in the areas of outreach and education, including coordinating responses on the issues of bycatch (South Atlantic and Gulf of Mexico), oyster population enhancement (Chesapeake Bay), zebra mussels (Great Lakes, New England, Mid-Atlantic), and amnesiac shellfish poisoning (Pacific Coast). Some of these activities have even been funded through a single regional coordinated proposal. Regional research activities have been less common. There are undoubtedly many missed opportunities for coordinating research efforts in the regions. The current statutes governing Sea Grant include guidelines for designation of Sea Grant Regional Consortia (33 U.S.C. 1126), but none have been designated.

Sea Grant Review Panel

SGRP was first established by legislation in 1976. It has the following statutory mandates:

The Panel shall advise the Secretary [of Commerce], the Under Secretary [for Oceans and Atmosphere], and the Director [of NSGO] concerning —

- 1) Applications or proposals for, and performance under, grants and contracts awarded under section 205 of this Act [33 U.S.C. 1124];
- 2) the Sea Grant fellowship program;
- 3) the design and operation of Sea Grant colleges and Sea Grant regional consortia, and the operation of Sea Grant programs;
- 4) the formulation and application of the planning guidelines and priorities under section 204 of this Act [33 U.S.C. 1123 (a) and (c)(1)]; and
- 5) such other matters as the Secretary refers to the panel for review and advice.

SGRP's mandate thus includes both review and advisory functions. It has 15 members from academia and industry. Its meetings have decreased in num-

ber recently due to funding limitations within NSGO; its expenses in FY1993 were approximately \$126,000. Despite a limitation on its meetings, SGRP has been very active and has recently produced a series of position papers on a wide range of issues involving Sea Grant (Appendix 4), including strategic planning and Sea Grant-industry interactions.

SGRP appears to be well suited to providing general programmatic review and advice to the Sea Grant program, but less well suited to providing scientific review and advice. It appears to have become more of an initiator of plans and advisor to NSGO (e.g., see SGRP position papers No. 2 and 3), rather than reviewing the overall program and plans developed by NSGO.

Finding: Management advice by NSGO is inadequate, NSGO and the state programs duplicate proposal review (Issue 4) and strategic planning (Issue 2), and SGRP has initiated activities that should have been undertaken by NSGO.

ISSUE 4 PROPOSAL REVIEW AND PROGRAM EVALUATION

At present, an arduous biennial process for research proposal review is conducted sequentially by the state programs and then by NSGO. NSGO subject area specialists and program monitors often conduct an entirely new scientific review of proposals, partially duplicating functions at the state level. NSGO also conducts whole program evaluations (and site visits) linked to project reviews. There are several serious problems with this approach. First, the length of the time between proposal solicitation, review, selection, and funding extends up to one and a half years. Second, proposal review and program evaluation are separate issues, and the system developed to handle them together is ineffective. The coupling of proposal review with program evaluation complicates the system, and the combined review process is not well suited for either purpose. It has resulted in significant redundancy of scientific review. This system has not permitted evaluations of balance within state programs or rewarded programs based on past performance. For example, state program directors noted that "the National Office must align its review process with that of the states...It will save money and a lot of time, and eliminate the current double review." Also, "the Sea Grant development, review, and funding process takes far too long and should be streamlined and speeded up. We have some good researchers who won't bother with the process for the relatively small projects funded under Sea Grant when they have other more attractive funding alternatives available." Finally, the role and excessive authority of the subject area specialists is a problem. These individuals, no matter how devoted or talented, cannot provide the breadth of expertise available by peer mail and panel reviews. Indeed, their reviews are viewed as redundant, duplicating efforts at the state level. The subject area

specialist position should be eliminated by using reviewers external to NSGO with responsibility for such review being concentrated at the state program level.

State program directors use a variety of means to solicit proposals. NSGO apparently does not monitor this process. Presently, most state programs conduct mail and/or panel reviews of the individual proposals before they are included in their omnibus proposals that are submitted to NSGO. All omnibus proposals are subjected to additional reviews by subject area specialists and program monitors at NSGO, and review by NSGO. NSGO scientific review of proposals may have been necessary in the past because state review processes have varied in their quality and state program performance in the area of proposal review was not necessarily evaluated. The purpose of the NSGO review of individual proposals is to help set the award size of each state program. After funding recommendations are made by NSGO, each state program has the opportunity to revise its omnibus proposal and resubmit it to NSGO. Most state program directors believe that this process takes much longer than necessary, and CSGD is developing a position paper⁹ on new processes designed to reduce the time required for proposal review. The committee finds that overall time from submission of preproposals to state programs until the final funding decision by NSGO is excessive.

On a subsidiary issue, a report issued by the National Association of State Universities and Land-Grant Colleges (NASULGC)¹⁰ presented information about the distribution of grant *processing* times of Sea Grant compared with other agencies that fund marine studies, specifically ONR and NSF (Figure 4). This is the time elapsed after all reviews have been completed. Recent information provided by NSGO indicates that the grant processing time decreased from FY1992 to FY1993 (Figure 4); however, it remains excessively long compared with the processing times of grants by ONR and NSF.

Table 1 shows a typical proposal cycle for a state program. The portion of time spent at NOAA is approximately 6 months of the 17-month period displayed, with the majority of the proposal process time occurring before the state programs submit their omnibus proposals.¹¹ Approximately 70% of preproposals and proposals are eliminated prior to submission of each omnibus proposal to NSGO (Figure 5).

The size of most programs has not changed substantially over the past 11 years. The coefficient of variation¹² for federal funding to state programs over

⁹ *Some New Approaches to Decision-Making in the National Sea Grant College Program.*

¹⁰ National Association of State Universities and Land-Grant Colleges. 1993. *The National Sea Grant College Program*, A white paper prepared by the Board on Oceans and Atmosphere, Commission on Food, Environment, and Renewable Resources, Washington, D.C.

¹¹ The omnibus proposal is the proposal for the entire state program, submitted once every two years. It includes all research proposals and all costs for outreach, education, and administration.

¹² Coefficient of variation equals the standard deviation of a series of measurements divided by their mean.

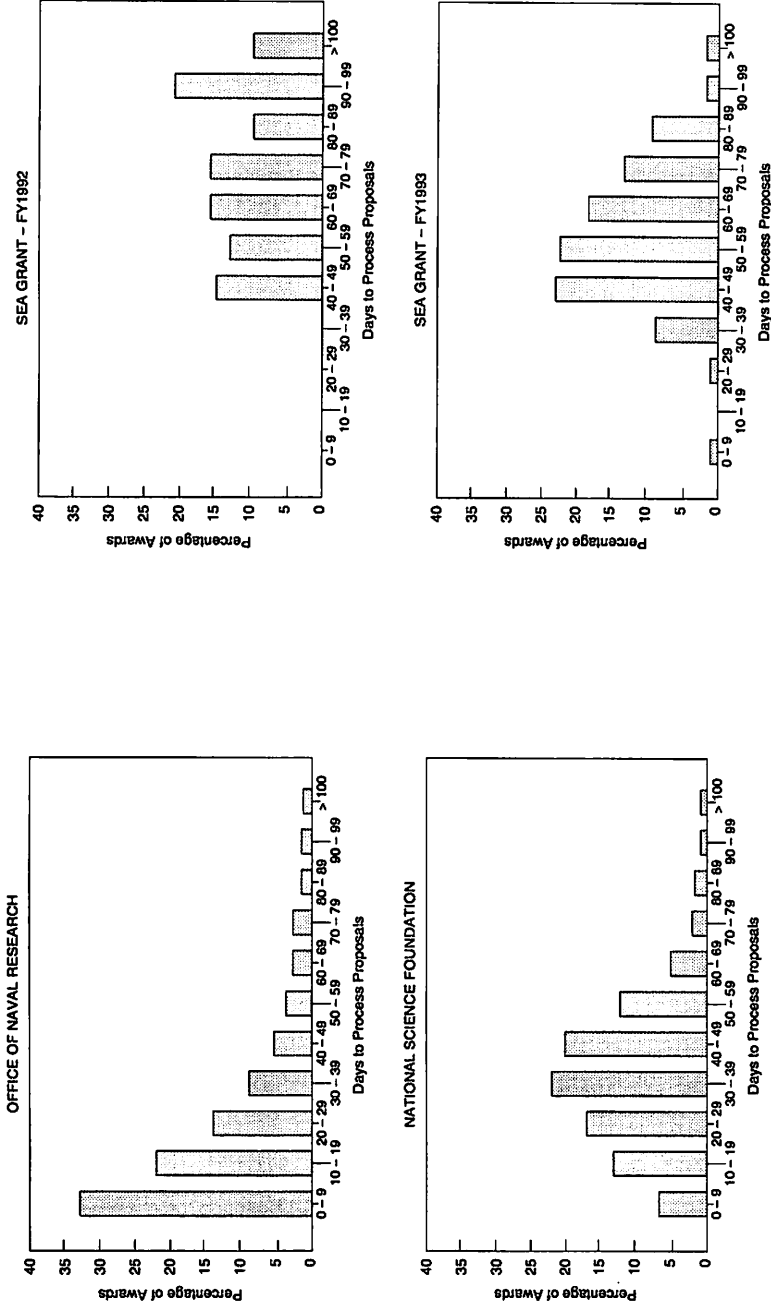


FIGURE 4 Comparison of the administrative time required to process research grants to university investigators after completion of external and internal scientific reviews, for the Office of Naval Research (FY1991), the National Science Foundation (FY1992), and the National Sea Grant College Program (FY1992 and FY1993).

TABLE 1 Example of Proposal Preparation and Processing Time (from the Oregon Sea Grant College Program)

State Phase	
1. Request for preproposals released	March 1 (year 1)
2. Preproposal preparation	↑
3. Preproposal review	11 months
4. Full proposal solicitation	↓
5. Full proposal preparation	
6. Full proposal review and programmatic evaluation	
7. Omnibus proposal prepared, printed, and sent to NSGO	February 1 (year 2)
NSGO Phase	
	↑
1. Subject area specialist and monitor reviews	3 months
2. NOAA grants processing	↓
3. Program review (site visit)	
4. Funding decisions	May 1 (year 2)
State and NSGO Phase	
	↑
Proposal revisions and resubmission to NSGO; NSGO/NOAA processing	3 months
	↓
Funds available to investigators	August 1 (year 2)

the period from FY1983 to FY1993 ranged from 3.7 to 35.3%, with a majority of programs having values below 9%. During this period, seven programs were designated as official Sea Grant Colleges; all but one of these programs had received similar funding levels before official designation.

There is a perception among some individuals both within and outside the Sea Grant system that the solicitation and review process is not "open," i.e., that certain universities do not solicit outside their campus or that individual proposals are funded on the basis of considerations other than quality and relevance of proposed work. Factors that contribute to this perception are that the solicitation and review process does not appear to be monitored, decisions do not appear to be documented, and rejections are not explained adequately. The committee was convinced, however, that strenuous efforts continue to be made by NSGO and state programs to disseminate information, about Sea Grant goals and its proposal mechanisms, very widely. This seems to be particularly true at the national level. Other extramural funding programs are much more careful about documentation of this type, and invite outside reviewers to evaluate the validity of their review process and decisions. An "oversight committee" similar to that used by NSF could readily be established to address such details.

The committee investigated the issue of perceived lack of turnover of principal investigators in two ways. First, directors were asked how they attempt to

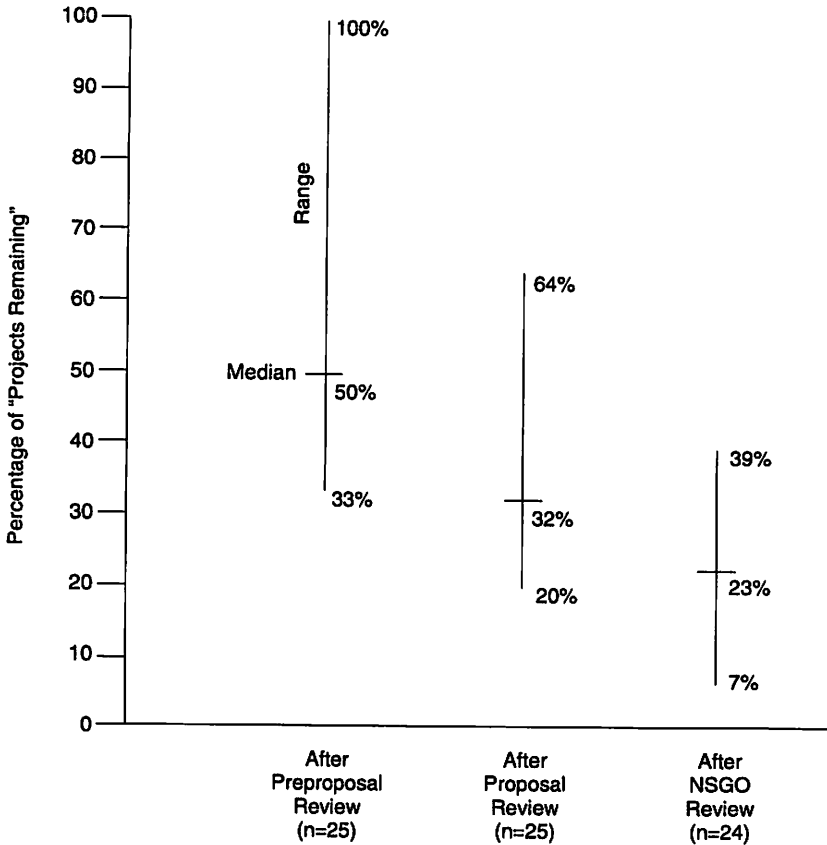


FIGURE 5 Effect of the state and federal review processes for Sea Grant preproposals and proposals

achieve openness of the proposal solicitation process and how they monitor it. Although the committee did not investigate the proposal solicitation procedures of state programs, virtually all programs stated that they attempt to maintain openness by wide distribution of proposal solicitations. For example, the largest state Sea Grant program, in California, sends out a request for proposals to 1,400 "individuals, departments, institutes, and grants offices of higher education institutions throughout the state" and, in the FY1993-94 cycle, funded research at 10 different institutions. Quantitative monitoring was reported by several states, and often took the form of an examination of the distribution of projects among educational institutions within the state and sometimes measurement of the turnover of investigators. Some programs make presentations about Sea Grant, and how to obtain Sea Grant funding, at universities around their states. Other pro-

TABLE 2 Change in the Composition of the Principal Investigator Pool over Time

Program	Time Span	% New PIs ^a	Increase in Investigators	%Net Turnover	# of PIs ^b
Sea Grant	1989-1993	56	3% over 4 yr	53	557
ONR	1989-1993	64	17% over 4 yr	47	612
NSF	1988-1993	76	36% over 5 yr	40	370
DOE	1986-1991	33	0% over 5 yr	33	36

^aThe percentage of new principal investigators (PIs) equals the number of investigators funded at the end of the time span that were not funded four or five years earlier, divided by the total number of investigators at the end of the time span. Calculations for DOE, NSF, and ONR were determined on the basis of the pool of all principal investigators funded by each agency. Calculations for Sea Grant were carried out on a program-by-program basis and the median of all program values is reported, although it is not substantially different from the mean (58%).

^bNumber of principal investigators at the end of the time span.

grams assert that they use less stringent review criteria for new investigators or for grants to universities not normally represented within their Sea Grant program.

Second, the committee gathered data from NSGO, the Department of Energy (DOE), ONR, and NSF regarding the inflow of new principal investigators over time (Table 2). These data indicate that, taking into account the percentage of new principal investigators and growth in the total number of investigators in each program, Sea Grant's net turnover is higher than that for ONR, NSF, and DOE. There was a great deal of variation in the percentage of new investigators among state Sea Grant programs, however, with the lowest value being 27% over four years and the highest value being 78%.

The openness of competition among programs was more difficult to measure. There was a significant positive correlation ($r = 0.824$, $p < 0.01$) between the length of time that a program has held Sea Grant College status and its level of federal funding (Figure 6). The federal allocation to state programs was not correlated to either the state population or the tenure of the director. Many of these programs received essentially the same level of federal funding, and presumably supported the same level of activities before they were awarded Sea Grant College status, so it is not clear why such a correlation exists. Because the committee did not evaluate the quality of state programs, it could not determine if the funding and quality of state programs are related. The committee recommended in Chapter 3, however, that state program performance in the three areas of research, education, and outreach be evaluated using well-publicized measurement methods, and funds be redistributed accordingly, on a four-year cycle.

Priorities of NSGO and the state programs are often different; consequently investigators who tailor their proposals to national priorities may have their ideas

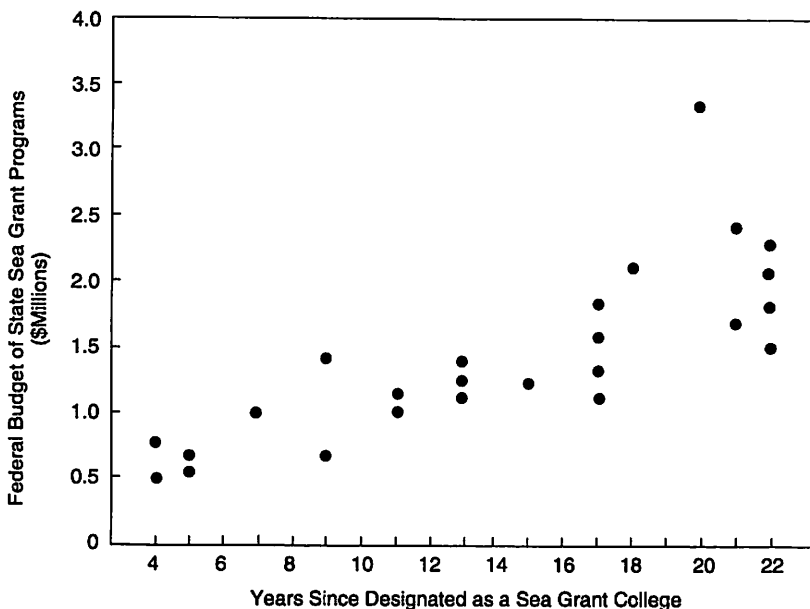


FIGURE 6 Effect of time since designated a Sea Grant College on the state program FY1993 budgets.

eliminated at the state level, and investigators who tailor their proposals to state priorities may have their proposals eliminated at the national level. Although many of the national priorities are stated vaguely enough to include many state priorities, the lack of specific advice does little to focus research dollars on either the real NSGO priorities or the state priorities. Matching funds available to state programs take some of the fiscal pressure off these programs, but this approach raises the issue of the balance of funding versus the balance of priorities. In view of the significant source of funding from nonfederal sources, state programs desire more flexibility to direct their programs toward the issues of importance to donors of the matching funds (i.e., to devote a greater portion of their funding to issues not in the national guidance document).

Finding: The Sea Grant process for reviewing research proposals and for processing grants is slow compared with other federal agencies and is not standardized at the state level. There is redundancy in proposal review between the state and national levels. The process is further complicated by being coupled to the overall program evaluation process.

ISSUE 5 INTERACTIONS WITH INDUSTRY

A central feature of the National Sea Grant College Program Act is that Sea Grant has an important role to play in fostering economic development, promoting technology transfer, and encouraging wise use of resources. Financial support from industry may fill the gap created by federal budget shortfalls but is forthcoming only if the investing company can anticipate a return on its investment, which depends, to a large degree, on the talent of the supported investigators and the availability and quality of any needed facilities. Clearly, enlisting industry financial support is within the state program purview.

State programs interact with industry on a regular basis through their MAS agents and through other means, such as problem-targeted industry advisory committees. MAS accounted for 32.4% of Sea Grant's FY1993 budget.¹³ MAS agents are similar to agricultural extension agents in being responsible for promoting the development of local industries and for providing advice to companies as they grow. In fact, the MAS portions of many Sea Grant programs are housed in the local Cooperative Extension Service units. MAS agents disseminate and apply information from a variety of sources: from their own and other Sea Grant programs, from elsewhere in NOAA, and from outside sources. They also function to relay information about research and education needs from industry to other participants in their Sea Grant programs.

Present interactions between Sea Grant and industry are primarily through state programs and primarily take the form of information transfer. In general, few of the state programs apply much industry money to match their federal funds. The percentage of match contributed by industry to state programs ranged from 0 to 40%, with a mean of 4%, though the median value was 0%.¹⁴ In part, this percentage is so low because many of the businesses with which Sea Grant interacts are small and have little money to invest in research. Many state program directors also noted that they did not use industry contributions to match federal funds because of arduous NOAA grant reporting requirements and because the industry match (often in-kind contributions) is often harder to document and more likely to be disallowed. Also, all matching contributions can be audited, even above the one-third match requirement. State program directors indicated that only rarely have they funded research by commercial entities, although many programs cited a few cases of industry scientists who serve as principal investigators or co-principal investigators.

Interactions of NSGO with industry are less well developed than those at the

¹³ By comparison, in FY1993 research accounted for 43% of funding, education and training accounted for 8.8%, and program management and development accounted for 15.9%.

¹⁴ These values were calculated from the 25 programs that responded with quantitative answers.

state level, and this seems to mirror the general situation within NOAA. Priority setting by NSGO could, in fact, hinder state interactions with industry when industry and national priorities differ. NSGO is planning to establish an Industry Fellows program, modeled after its successful Knauss Marine Policy Fellows program. Although the committee was not provided with much information about this program because it is still early in the development process, the placement of recent graduates in a "real" work place for one year could serve both the company and the student *if* the student selection process is thorough and balanced. Apparently, this is the only direct contribution of NSGO to improving interactions with industry.

In another industry-related initiative, Sea Grant contributed \$223,600 to the Small Business Innovation Research (SBIR) program in FY1994. SBIR proposals are handled for Sea Grant and other NOAA programs by the NOAA Office of Research and Technology Applications. All NOAA Line Offices and Programs that fund extramural research transfer a percentage of their extramural research budget (a minimum of 1.5% in FY1993-FY1994, 2.0% in FY1995-FY1996, and 2.5% thereafter) to this office. Programs that contribute finances also submit topic areas for inclusion in the overall DOC proposal solicitation and contribute representatives to the final selection panel that weighs peer reviews and makes award decisions. Sea Grant's SBIR contribution comes from within NSGO's administrative funding cap; its contribution will rise to approximately \$512,000 in FY1995 due to the increase in percentage and a NOAA-wide change in the way the SBIR contribution is calculated, if Sea Grant receives the amount of funding requested in the FY1995 President's budget.

The 29 state programs and NSGO currently interact with marine industry through management advisory bodies, MAS, and a limited number of applied research projects. These interactions are tightly focused, limited primarily to small companies, and are not a significant source of Sea Grant program funding. Industry committees are sometimes used to evaluate the relevance of proposed research projects. State programs may use these mechanisms to determine how to target their research and outreach activities. The actual priority given to industry needs seem to vary from state to state, but the priority is difficult to judge from responses from state program directors. The mutually beneficial opportunities of university-industry cooperation envisioned by the Sea Grant program founders have not been realized.

SGRP produced a position paper (#3) on Sea Grant-industry relations that makes a number of relevant recommendations. It recommends that a policy be developed for Sea Grant-industry relations to comply with the National Sea Grant College Program Act. The policy would include guidelines for industry involvement at state and national levels and would include the development of a Sea Grant corporate relations program. SGRP also recommended that a review be undertaken, documenting existing benefits and constraints to industry involvement in Sea Grant.

SGRP, with its strong industry orientation, could play an important role in developing Sea Grant-industry partnerships. Indeed, SGRP views this as one of its primary mandates.¹⁵ It has formed a Business Initiative Committee "to play an active role in developing the SBIR and NIST relationships and continue to help develop Sea Grant in the development of coastal business."¹⁶ The committee commends this activity but is concerned that NSGO is not playing a greater role in promoting Sea Grant-industry partnerships.

Finding: The mutually beneficial opportunities of university-industry cooperation envisioned by Sea Grant program founders have not been realized.

ISSUE 6 FUNDING

A principal finding of the NASULGC white paper on NSGCP was that Sea Grant has not received a level of support from DOC reflecting the high national priority otherwise assigned to research and development activities by both the administration and Congress. In fact, DOC, "through inefficient and inconsistent administrative procedures," has impeded the development and operation of NSGCP and prevented the program from "making its full potential contribution to the nation."¹⁷

The argument has been made that NSGCP is actually a congressional program of aid to states, and this perception has been used by the previous administrations (and by the Grace Commission¹⁸) to recommend limiting or even eliminating federal funding for the program. In 1981, the administration recommended scaling back NSGCP and other NOAA extramural programs. In review, DOC recommended complete elimination, rather than scaling back, but Congress protected the program, albeit at a reduced level of funding. Congressional intervention kept NSGCP in the budget for the next eight years during which period there was an overall erosion of the program's fiscal resources and scientific capabilities.

NSGO attempts to minimize fluctuations of state program funding, and most states have experienced level funding for the past 11 years. Program percentage match has fluctuated between 40 and 47% during this period. About half of the state programs use a project-by-project match versus applying match on a pro-

¹⁵ SGRP Position Paper #3.

¹⁶ November 1993 SGRP minutes.

¹⁷ NASULGC, op. cit., p. 7.

¹⁸ Grace Commission. 1993. *President's Private Sector Survey on Cost Control*, Volume 9, pp. 143-144.

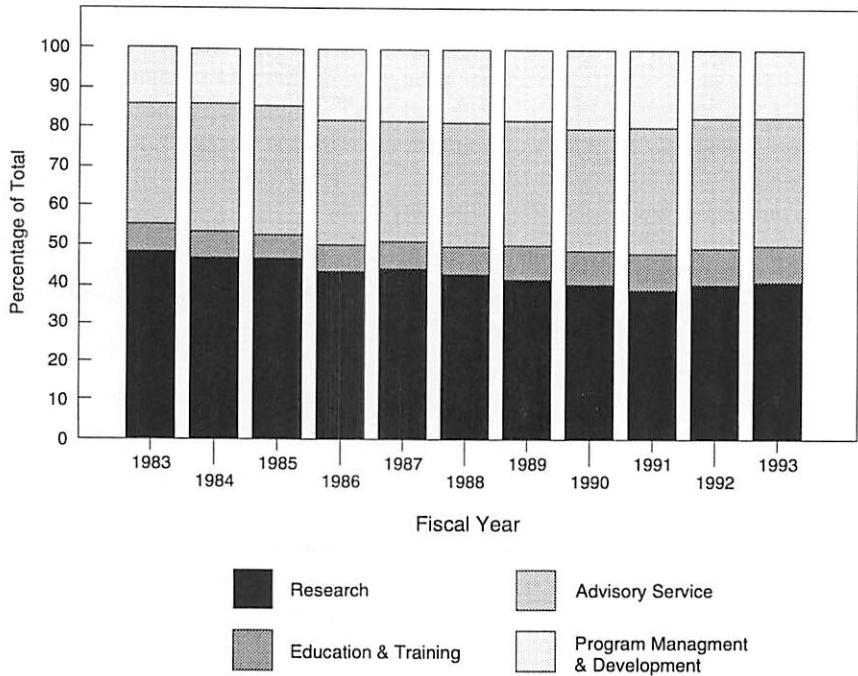


FIGURE 7 Percentage of state Sea Grant program funds allocated to research, education and training, advisory services, and program management and development, FY 1983 to FY 1993.

gram-wide basis. Even for those programs that seek match for each project, most allowed some flexibility in this requirement.

The group of state Sea Grant programs has spent an average, over the past 11 years, of 44.3% on research, 7.1% on education, 31.5% on advisory services, and 17.0% for program management and development (Figure 7). These values have not varied much over time. Actual state Sea Grant support of educational activities is greater than 7.1% of the budget because much of the support labeled as "research" actually funds the education of graduate students involved in the research. Yet, the finding that state program administration costs are a factor of two greater than dedicated education support is an issue of considerable concern to the committee.

The number of projects funded, both research (Figure 8) and all projects (Figure 9), and the dollar amounts allocated to each project have remained relatively constant over the last 11 years. The real value of these grants, however,

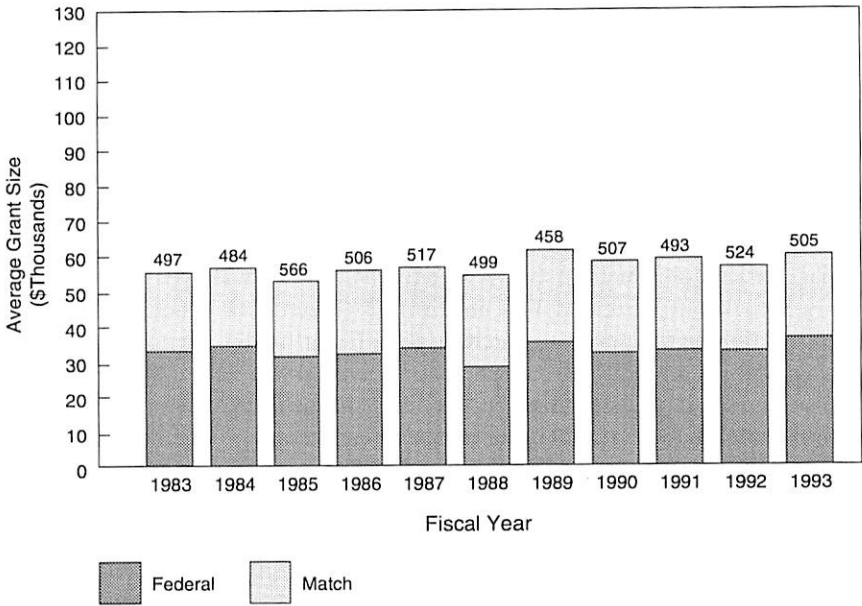


FIGURE 8 Mean Sea Grant research award size from FY1983 to FY1993. The number of awards is shown above the bar for each year.

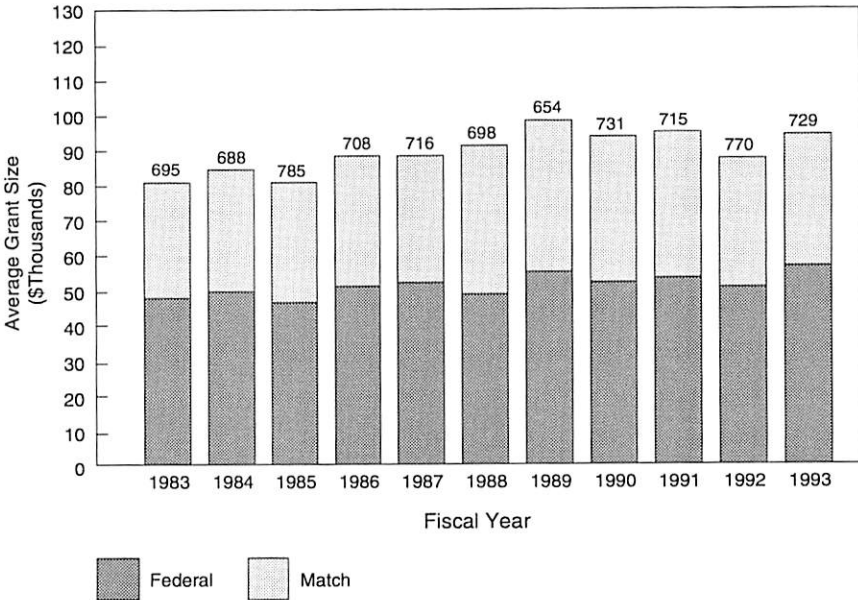


FIGURE 9 Mean size of all Sea Grant awards from FY1983 to FY1993, including research, education, advisory services, and administration. The number of awards is shown above the bar for each year.

has eroded by 45%¹⁹ or more over this time period due to inflation, greatly reducing the attractiveness and potential payoff of each funded project.

The history of funding for NSGCP shows a significant decrease in funding per institution (in 1971 dollars) since the program's incorporation into NOAA within DOC, from \$780,000 in FY1971 to an FY1993 average of about \$683,000 per institution (Figure 10). The average grant (in 1971 dollars) for individual research projects (federal plus match) dropped from \$34,400 in FY1983 to \$29,300 in FY1993. The mean award for all proposals was \$93,800 in current dollars (federal plus match); the average research award was even smaller, averaging \$59,700 in current dollars in FY1993 (Figure 11), much smaller than adequate for some types of research that Sea Grant funds. By comparison, the mean grant size for the NSF Ocean Sciences Division was \$210,000 in FY1993.²⁰ The committee recognizes that effective mechanisms need to be implemented to ensure that each award is adequate for the proposed task.

Almost without exception, the state Sea Grant program directors reported that the greatest cause of Sea Grant's eroded capabilities has been the combined effects of the program's level funding coupled with inflation. It must be recognized that funding levels need to be adequate to support a high caliber of research carried out by high-quality scientists and students who constitute a healthy and productive research program.

Finding: Level funding, growth in the number of participating state programs, inflation, and increased NSGO administrative costs have severely eroded the real purchasing power of NSGCP since its inception and are preventing the program from providing its full potential contribution to the nation.

¹⁹ The Consumer Price Index (CPI) rose by 45% during this period. Adjustment using the CPI provides a conservative estimate of the erosion of grants for university-based activities, given the probable increase in university overhead rates, tuition, and costs of research at a rate greater than the overall inflation rate.

²⁰ According to the NSGO director, 50.6% of Sea Grant funding to states is used for salaries and benefits compared to 37.9% of National Science Foundation awards. The NSGO director noted that Sea Grant may have a higher percentage of funding devoted to salaries because it funds salaries related to research proposals plus salaries related to state program administration.

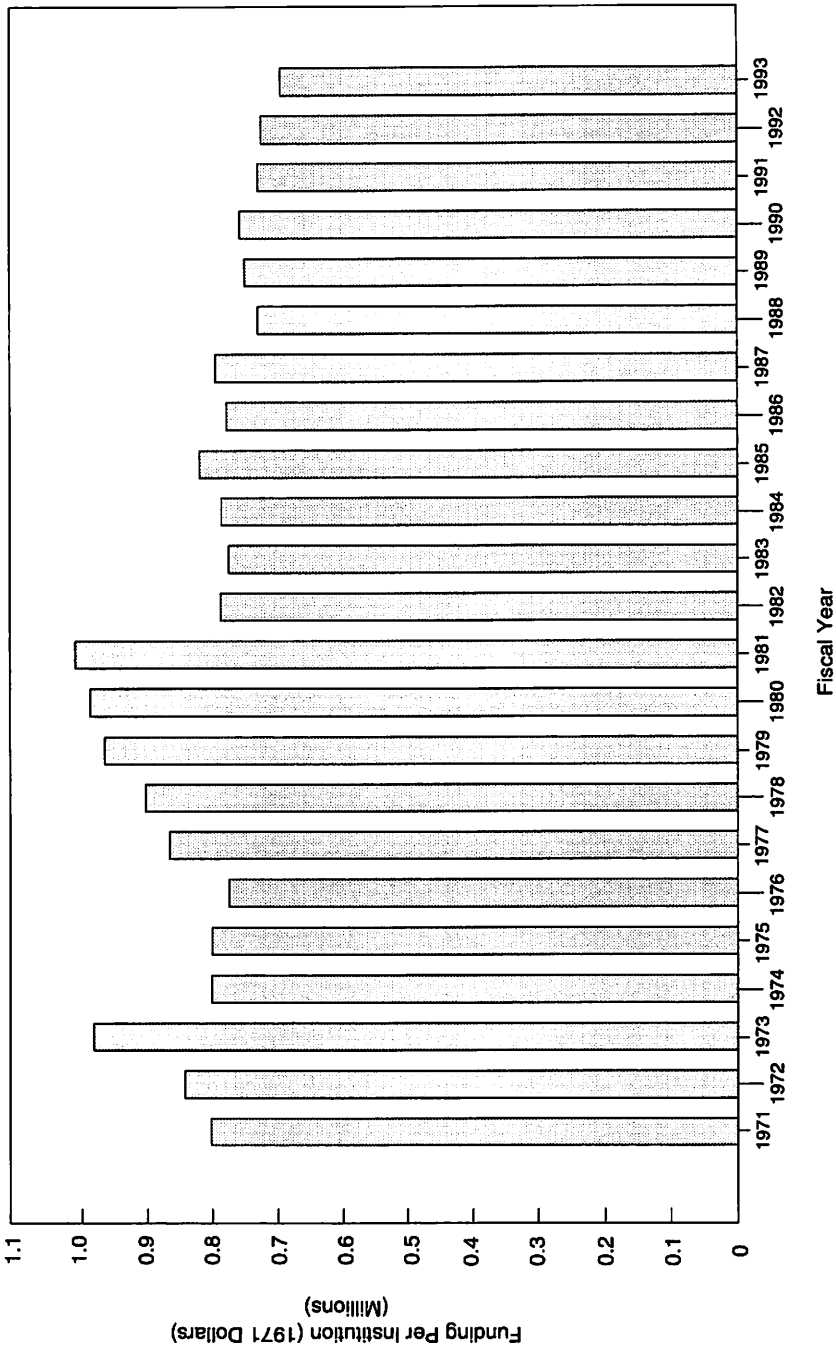


FIGURE 10 Mean federal funding per Sea Grant institution from FY 1971 to FY 1993, adjusted for inflation (in 1971 dollars).

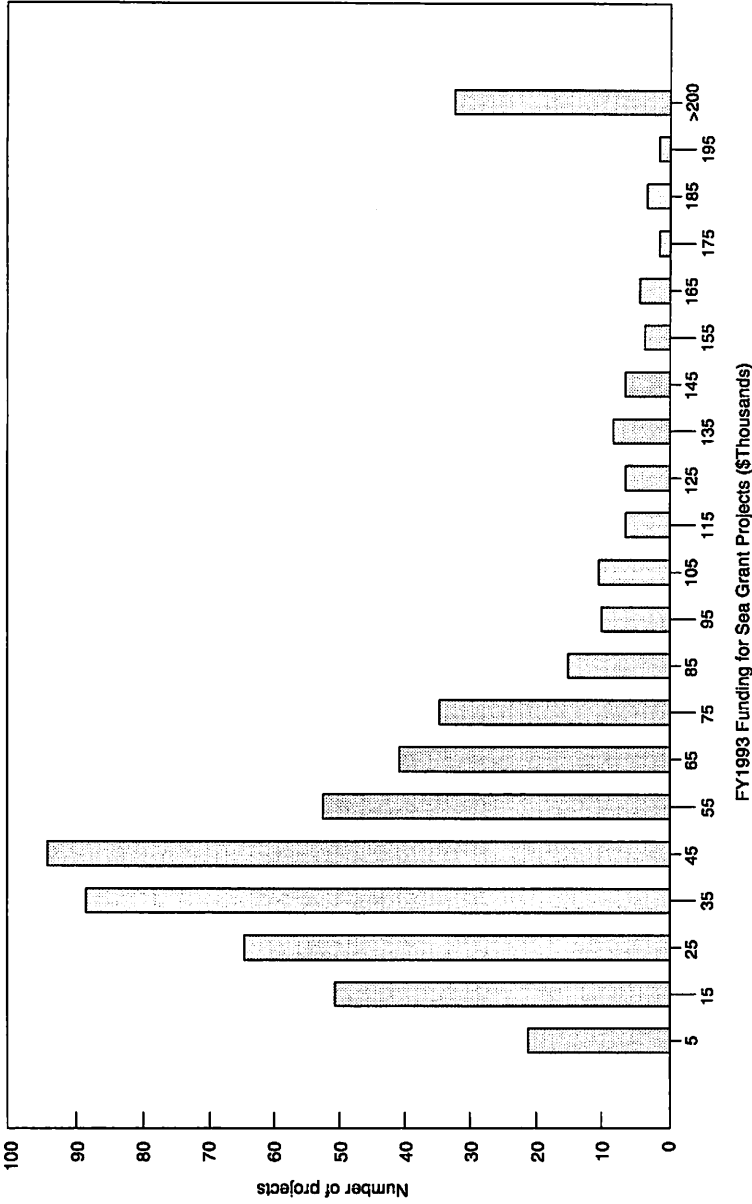


FIGURE 11 Distribution of federal Sea Grant award dollar amounts in FY1993, including awards for research, education, advisory services, and administration. The values on the x-axis are the midpoint of ranges (e.g., \$5,000 is the midpoint of the range from \$0 to \$9,999).

Recommendations

ISSUE 1

SEA GRANT'S POSITION WITHIN NOAA

Recommendation: The Administrator must ensure that the National Sea Grant College Program (NSGCP) has *appropriate* responsibility and capability for research, education, and outreach across the National Oceanic and Atmospheric Administration (NOAA). NSGCP should be relocated within NOAA to report directly to the Office of the Administrator.

The committee recommends that the Under Secretary remove Sea Grant from within the NOAA Office of Oceanic and Atmospheric Research and either make it equivalent to the Coastal Ocean Program and the Climate and Global Change Program or place it administratively within the Office of the Administrator, so that it can function independently and effectively across Line Office boundaries. Sea Grant needs to be able to reach across Line Office boundaries to provide its expertise to the Line Offices to solve NOAA problems and provide new capabilities that require combinations of Sea Grant strengths with those of the Line Offices. Elevating Sea Grant in the NOAA structure should improve Sea Grant's service to NOAA and NOAA's service to the nation. In addition, activities in other Line Offices could contribute to Sea Grant. For example, satellite activities funded by the National Environmental Satellite, Data, and Information Service, the National Ocean Service (NOS), and the Coastal Ocean Program could contribute to Sea Grant studies in the coastal zone. The manage-

ment of the National Undersea Research Program should be separated from the management of Sea Grant.

The committee recommends that NOAA implement the proposed reorganization as part of its FY1996 budget. An alternative solution, to remove Sea Grant from NOAA, or even from the Department of Commerce (DOC), was discussed by the committee. The committee agreed that improving the health of the program and enhancing its capabilities to serve national needs could warrant such a drastic step. It would be preferable, however, to leave Sea Grant within NOAA and DOC, and to make the changes necessary to make NOAA and DOC supportive of Sea Grant and to enhance Sea Grant's contribution to NOAA's national mission and capabilities.

As Sea Grant is elevated within the NOAA structure, it is likely that some other reorganization will be desirable, shifting some responsibilities and fiscal resources among Sea Grant and the Line Offices. The Under Secretary should review the NOAA budget to coordinate (and integrate, where appropriate) similar research, education, and outreach activities in different parts of NOAA and to apply Sea Grant strengths in other parts of NOAA, noting that Sea Grant can provide significant information and interface with the industry and university communities, which would be of benefit to NOAA. For example, NOS outreach and education activities should be coordinated with similar Sea Grant activities. NOS has several relevant programs, including the Coastal Zone Management Program, the Marine Sanctuaries Program, and the National Estuarine Research Reserve program, that have outreach and education functions. Like Sea Grant, these programs support substantial interactions between states/localities and NOAA. Sea Grant's research apparatus and experience in education and outreach could contribute to the goals of these programs. Sea Grant also has obvious potential interactions with the new NOAA Office of Sustainable Development and with the NOAA-administered National Coastal Resources Research and Development Institute because of Sea Grant's responsibility within NOAA for natural resource research, development, education, and outreach.

Because of its capabilities in the area of environmental education, an elevated Sea Grant could be a major participant in the initiative of the U.S. Vice President, entitled Global Learning and Observations to Benefit the Environment (GLOBE). GLOBE is an interagency activity for which NOAA requested \$7 million in the FY1995 President's budget. Its purpose is to increase the degree to which U.S. citizens understand the natural environment, by involving a global network of schools in collecting environmental observations. Sea Grant already has an established state and county outreach structure, and has statutory authorization to conduct an international program. Both factors equip Sea Grant to have a substantial role in GLOBE.

Sea Grant's network of state-based researchers, Marine Advisory Service (MAS) agents, and communicators provides a great potential capability for gathering information. In addition to present Sea Grant activities, NOAA should

seek ways to use this network to identify impending coastal problems, to gain feedback about the effects of NOAA policies, and to develop a strong state presence for all NOAA programs.

As DOC has reasserted its interest in Sea Grant over the past few years by reinstating it in the President's budget, Sea Grant should be integrated not only in terms of personnel, but also in joint financial initiatives within DOC. Sea Grant is the logical focus for NOAA interactions with the National Institute for Standards and Technology (NIST), the Economic Development Agency, and the Office of Tourism. NOAA and NIST each operate essentially separate Small Business Innovation Research (SBIR) programs; they should consider providing joint funding for a number of SBIR projects related to marine technology and other topics of mutual interest.

Maintaining collaborations across organizational units results in "transaction costs" that create barriers to interactions. Because of these costs new mechanisms are required to establish the benefits of collaboration, such as the provision of resources earmarked for joint activities. The Climate and Global Change Program and the Coastal Ocean Program have developed successful mechanisms for encouraging NOAA-academic interactions. Similarly, Sea Grant could provide funding to encourage joint activities between state programs and Line Offices.

ISSUE 2

SHARED VISION AND STRATEGIC PLANNING

Recommendation: State Sea Grant directors and the Director of the National Sea Grant Office (NSGO) must cooperate to develop a single strategic plan articulating a shared vision and strategies which must be fully integrated into, and reflective of, NOAA's strategic plan. Unified Sea Grant strategic planning should begin immediately so that its results can be incorporated in the FY1997 NOAA budget.

The committee recommends that the separate strategic planning activities being carried out by NSGO and the Council of Sea Grant Directors cease and that the Under Secretary implement a process to integrate these activities in a single strategic plan for Sea Grant. The present parallel approach is unlikely to produce a plan that can be supported by all major stakeholders in the Sea Grant system. That two parts of the same organization are providing such independent plans is indicative of a serious management problem. The new plan should use the existing efforts and the NOAA strategic plan, when appropriate, as inputs.

The committee recommends that the process used to develop the Sea Grant strategic plan acknowledge that Sea Grant activities exist at the intersection between state and national interests and that it respond to each level, as well as

utilize opportunities and blending capabilities from both levels. To accomplish this balance, the plan should be developed by a group consisting of state program staff, NSGO staff, university administrators, academic scientists, industry representatives, and representatives of the Office of the Under Secretary. In fact, only through the process of developing and implementing such a strategic plan can the Sea Grant participants become partners in developing a common vision. The committee recommends that the plan contain a strong "bottom-up" orientation by fully integrating plans and activities from the state programs with the goals and directives described in the NOAA strategic plan. Due to the multistate nature of NSGCP, national needs may, in large measure, be the sum of state needs. Strategies developed should reflect the diverse roles and responsibilities of the Sea Grant partners described in Recommendation 3.

Strategic plans typically include information about the organization's position within a particular niche or a few niches. Sea Grant's unique niche is described on page 9 and elsewhere in this report. It is imperative that Sea Grant work to fill this niche and particularly to expand its interactions with industry. It should avoid overlapping with other federal agencies, such as the National Science Foundation (NSF) and the Office of Naval Research (ONR). Strategic planning can provide a new mechanism to promote interdisciplinary research and education activities in states and regions.

The plan should include guidance about how to measure the performance and effectiveness of all Sea Grant activities, including research, outreach, and education. The plan should also help Sea Grant define how it will interact with other complementary entities within NOAA and DOC. The plan should provide a long-term (5- to 10-year) vision of Sea Grant's future and should be reexamined and adjusted approximately every 3 years.

The Under Secretary should provide NOAA funds to help Sea Grant with its strategic planning, if needed. NOAA should help Sea Grant to focus its activities on the areas where it is best suited and which reflect a cross-NOAA orientation. Although high-quality research must be a goal, research funding should be oriented to solution of environmental, social, and economic problems in a way that is complementary to research funded by other agencies. The committee also recommends that NOAA use the completed Sea Grant strategic plan in construction of future NOAA-wide strategic plans and budgets.

ISSUE 3

OVERLAPPING ROLES AND RESPONSIBILITIES

Recommendation: The roles and responsibilities of the state Sea Grant directors, NSGO, and the Sea Grant Review Panel (SGRP) must be clarified. The resultant roles and responsibilities of NSGO and SGRP should be clarified by the NOAA Administrator prior to the 1995 reauthorization.

NSGO should concentrate on the facilitation and coordination of regional and national programs and initiatives, national strategic planning, guidelines for state proposal solicitation and peer review, and the comprehensive evaluation of individual state programs. NSGO should also be responsible for convincing other parts of NOAA about the benefits of using Sea Grant's capabilities. Without the leverage of financial resources or directives from upper NOAA management, however, NSGO is left to intellectual persuasion to overcome bureaucratic barriers. NSGO should place more emphasis on management of the overall program and decrease its direct role in scientific review. More detail on the role of NSGO in the review process is given in Recommendation 4.

NSGO should coordinate the formation of more formal and extensive Sea Grant regional activities to foster coordination and cooperation in programs of regional interest. The committee agreed that there would be a great benefit to the extension of regional partnerships. NSGO should orient many of its activities toward promoting regional networking of Sea Grant programs, expanding on the present regional network, and reviewing and monitoring progress at regional levels. The Regional Marine Research Program (RMRP) was created in 1990 (P.L. 101-593) to focus research on regional water quality and ecosystem health issues.¹ The boards set up for each region are chaired by a state Sea Grant program director. These regional programs could provide a foundation for Sea Grant regional activities, although the future of RMRP is uncertain; only one of the nine regions (the Gulf of Maine region) has received research funds so far.

State programs should focus on the scientific and programmatic quality of their individual programs. They should be allowed the maximum flexibility to determine funding priorities and program configuration as long as scientific quality and programmatic efficiency and effectiveness are maintained. Sea Grant should primarily be a bottom-up program, using information and plans from state levels to drive the national core program. But, state programs in conjunction with NSGO should immediately develop the appropriate program-wide measurements of the quality, efficiency, and effectiveness of their research, outreach, and education programs that will be used by NSGO in its performance evaluation. Measures of the costs and benefits of administrative activities should also be developed by the state programs and by NSGO.

SGRP should shift its focus toward long-term planning and program-wide issues for Sea Grant as a whole, in particular on the relationship between Sea Grant and the private sector and the quality of the overall NSGO and state programs. SGRP should meet with the Secretary of Commerce and the Under Secretary for Oceans and Atmosphere annually, and should produce a compre-

¹ Bryant, B.C. 1993. The Regional Marine Research Program (RMRP): A new approach to marine research planning. *Coastal Management* 21:327-332.

hensive review of NSGCP regularly. In particular, SGRP should review the Sea Grant strategic plan and the annual guidance document, and should review NSGO once every four years. The well-intentioned guidance provided by SGRP should be refocused on major policy issues.

ISSUE 4

PROPOSAL REVIEW AND PROGRAM EVALUATION

Recommendation: The review process for research proposals should be decoupled from the NSGO evaluation of state programs prior to the 1995 reauthorization. Standard scientific and peer review procedures should be implemented for all state Sea Grant programs. The review process and all aspects of program implementation, including administration, should be streamlined prior to FY1996. NSGO should evaluate the success of each state program on a four-year cycle, using, in part, retrospective information on recent achievements, based on measures for each of the three areas of research, education, and outreach. SGRP should evaluate the performance of NSGO on the same timetable.

The committee recommends that the processes for proposal review and program evaluation be separated. In addition, review of proposals composing the "core" state programs should be separated from the review of new initiatives. The new process should eliminate redundant review at state and national levels while maintaining proper quality control and guiding program improvement.

Proposal Review

Many states issue broadly distributed solicitations for preproposals before a full proposal is written. Preproposals provide an efficient means of removing project ideas that do not fit within program guidelines. The use of preproposals or other screening processes should be at the discretion, direction, and responsibility of the state directors, but the process used should be thoroughly examined as part of a four-year program evaluation by NSGO. Decisions made at the preproposal stage should be well documented and available for subsequent review. Priorities expressed in the solicitation phase should reflect strategic planning at both the state and national levels (see Recommendation 2).

One criticism of the present system is that state programs do not distribute requests for proposals (RFPs) far enough in advance. The committee recommends that a generic proposal solicitation process be developed for all state programs by NSGO and that the state RFPs be widely distributed at least six

months prior to submission deadlines. The solicitations should contain descriptions of key areas of interest and clearly detail the requirements of scientific excellence coupled with technical application to state, regional, or national needs.

Prior to its submission to NSGO, each full research proposal should be subjected to a rigorous review process at the state level, including a peer review for scientific quality and a separate evaluation of its potential for application to state, regional, and national needs and technological application. The committee did not investigate the quality of present state-level reviews. It is reasonable to assume, however, that delegating scientific review to state programs will require means for NSGO to measure state program performance in this area and to improve review processes of any state programs that are substandard. It is paramount that the overall processing time be reduced from 17 months to less than 6 months, a duration that would correspond to typical processing times at other agencies. The processing time in the states should be reduced to three months or less. The proposal solicitation and review process carried out by the individual state programs should be standardized, with procedures worked out cooperatively by NSGO and the state programs. Standardization will allow quantitative monitoring of the process by NSGO and comparisons among programs. A national pool of reviewers could be developed to enable state programs to select qualified external reviewers. Use of reviewers from such a pool should not be mandatory, however. The directors must be responsible and held accountable for the selection of peer and relevancy reviewers and for the conduct and conclusions of the review when programs are evaluated every four years, thus removing the need for additional review of project proposals by NSGO.

A director's decisions about whether or not to fund a proposal should be based on written peer reviews, programmatic considerations, and the results of local advisory panels, and should include discussions with NSGO. The handling of each preproposal and proposal, and decisions that were made on a project from initial submission of a preproposal to acceptance or rejection of a proposal by a state program, should be documented and communicated to the proposing investigator(s) and to NSGO staff. The director should prepare a decision statement with rationale for his/her decision based on technical merit and relevance. The materials submitted by the director in the omnibus package should provide information that justifies decisions made.

There is a perception that Sea Grant is not sufficiently open to new investigators. According to data collected by the committee, the Sea Grant program turns over its pool of principal investigators more quickly than several other agencies that fund marine research. The misperception about Sea Grant's openness can be dispelled only by developing and implementing procedures that allow program openness to be measured, monitored, and reported annually, including comparisons with other marine research programs. Examination of the investigator turnover rate should be included in the program evaluation, and programs with unacceptable turnover rates should be required to improve. Some

agencies, such as the ONR, set goals for turnover rates of investigators; ONR specifies that 10 to 15% of grants are to be awarded to new investigators each year.

The committee recommends that the Under Secretary investigate ways to reform the NOAA grants management system to reduce the processing time at NOAA to a length at least as short as for other agencies (e.g., ONR and NSF). Reform of grants management should be beneficial for all NOAA extramural funding, not only for Sea Grant funding. This must be done with the assistance of DOC and could be modeled after systems used by other extramural funding programs.

Program Evaluation

The committee recommends that state programs be evaluated once every 4 years by NSGO, replacing the biennial combined proposal/program review and the 10-year recertification. Instead of evaluating programs on the basis of proposals for new research and other proposed state activities, program evaluation should be based primarily on the research, outreach, and education using retrospective measurements of the achievements over the previous four-year performance period. Each director should assume responsibility for defending the process leading up to the omnibus proposals submitted during the previous four-year period, as well as the relative success or failure of his/her total program. The NSGO evaluation should consist of an on-site, thorough assessment of overall program quality, including excellence of research, applicability and relevance of research findings, and the quality of program management, marine advisory services, education, and communications. In four-year funding decisions, NSGO should emphasize identifying excellence, based primarily on past performance, and rewarding the best state programs with increased funding. The NSGO program evaluation process should include rigorous standards for individual state program performance (research, education, and outreach), based in part on measured impact.

NSGO, in concert with state program directors and education specialists, should evaluate education, outreach, and communication efforts in the context of the Sea Grant strategic plan. Although state directors cited many pertinent examples of how they evaluate non-research components, it is not clear that state programs consistently target their efforts at specific audiences and measure the effectiveness of these efforts. They should determine which audiences are priorities and which education and communication methods (e.g., printed, mass media, teaching) are most effective for reaching each audience, and should develop instruments to measure the achievement of objectives quantitatively. Communications, advisory services, and education activities should be evaluated as part of the four-year program evaluation and might not be measured by the same review criteria as are research proposals. Clear measures of quality for these activities

need to be developed. University administrations of the Sea Grant Colleges should participate in the review of the efficiency, impact, and effectiveness of their programs and their administration. Such involvement will enhance the commitment of the universities to their successful programs.

Core funds received by all programs in FY1996 and FY1997 should be set at FY1995 levels to provide funding stability during the transition. The first of the four-year program evaluations should begin immediately, and the cycle should be completed by FY1998. Programs should receive their previous funding levels until after each four-year evaluation is completed. Changes in the overall funding level of each program would occur in two ways. First, the outcome of the program evaluation would be a recommendation by NSGO, reviewed by SGRP, that the level of funding be increased (or decreased) for each program during the subsequent four-year period. The second opportunity for a change in funds, in this case an increase, would involve new regional, national, or international initiative monies available during the period on a competitive basis from NSGO, as supplements to core funding. This approach gives NSGO a different review focus, switching from an individual project review to a national evaluation, judging among programs at four-year intervals, which will eventually serve to improve all Sea Grant programs nationwide. This approach also removes the need for redundant scientific review by NSGO subject area specialists. This efficiency would either free up time for these staff members to increase ties for Sea Grant within NOAA or permit the overall administrative costs to be reduced.

An important role for NSGO program monitors should be to help lower-rated programs to improve their performance between the four-year reviews. This could be accomplished, in part, by assigning program monitors to state programs for on-site duty until problems are addressed sufficiently. Directors and program monitors should cooperatively develop and implement plans to improve each program between reviews. Dramatic four-year reductions in funding should be avoided, but more competition among the programs should occur. Sea Grant should consider funding only one Sea Grant College per state and at recertification might consider alternative institutional homes for each state Sea Grant program.

National Initiatives

Initiatives to address nationally important problems should be developed through the strategic planning process (see Recommendation 2). Proposals for national, regional, and international initiatives should be reviewed separately from core state program allocations by independent panels (see Recommendation 6).

ISSUE 5

INTERACTIONS WITH INDUSTRY

Recommendation: NSGO and the state Sea Grant programs must increase their interactions with marine industry to include program policy guidance, expanded outreach and marine advisory services, joint research projects, and substantial industry financial support of the Sea Grant program. Action to address this recommendation should form part of the examination of the performance of each state program. These actions should be identified in the Sea Grant strategic plan.

NSGO should develop mechanisms to involve industry in setting national goals and objectives. The state programs must play a leadership role in improving Sea Grant relations with industry, with assistance from SGRP and NSGO. The state programs should target outreach programs to industry, direct research priorities to real industry problems, and recommend industrial participants to advisory boards and NSGO committees. The committee recommends that the Under Secretary consider requesting that NSGO take a greater role in running the NOAA portion of the SBIR program because of Sea Grant's capabilities in the areas of outreach and technology transfer. If Sea Grant had the opportunity to administer NOAA's SBIR program, it could be a means to improve Sea Grant and NOAA partnerships with industry and would provide an opportunity for Sea Grant to become more involved in "demonstration-level" projects. At present, it appears that Sea Grant and NOAA view the SBIR program as a drain on their resources and not as a potential vehicle to increase interactions with industry.

The extent and continuity of industry support of Sea Grant depends on the real or perceived "value received" from its investment. Although every effort must be exerted by NSGO and SGRP to encourage industry support, the quality of the research or advisory service will ultimately determine industry's level of participation.

SGRP should help NSGO create a national industry outreach program. SGRP has a strong industry orientation, but the range of industries represented on the panel should be increased. It should recommend to the Under Secretary ways to develop closer ties with NIST and other relevant parts of DOC.

Objectives and actions to address this recommendation should be included in the Sea Grant strategic plan. The actions must begin immediately at the national and state levels and will form part of the examination of each state program. MAS activities must be broadened to include new activities such as oil spill clean up, recreational waterways use, dredging, and other problem areas, rather than its perceived emphasis primarily on fisheries. It is important for MAS to recruit some of its specialists from industry so that the range of perspectives can be broadened within MAS.

The goals of improved interactions should be to foster partnerships between Sea Grant and industry in a proactive way that speeds the transfer of technology and couples the intellectual capital of the universities to the marketplace of industry. This is best implemented at the state level. The committee recognizes that government-sponsored technology transfer is not always successful. Given Sea Grant's experience and the potential benefits of technology transfer, however, Sea Grant should increase its technology transfer efforts as another means to improve NOAA-industry interactions. State programs should consider funding joint industry-university research projects aimed at industry-identified constraints to growth and competitiveness. New technology development and testing should be a high priority for these partnerships and Sea Grant can assist by bringing together interdisciplinary and multi-institutional programs. Sea Grant could occupy an important niche by promoting the interaction of industry and academia in joint research projects. When representatives of industry believe they will achieve a satisfactory return on investment (results of research and development that address their real needs), they will invest significant monies in Sea Grant. The relationship between Sea Grant and the National Coastal Resources Research and Development Institute should also be evaluated for its potential to enhance Sea Grant-industry relationships.

State Sea Grant programs could also help industry by developing education and outreach activities that target vocational-technical schools and community colleges because of the important role of these educational institutions in providing graduates for employment in marine industries. Marine Advisory Service programs could contribute by helping design curricula, serving as information resources, and bringing the educational capabilities of Sea Grant to this problem. Involvement by state Sea Grant staff and investigators could ensure the combination of appropriate disciplines and participants (academic, industry, and government) in a given training program. This type of activity could improve Sea Grant's service to industry and encourage more support from industry.

ISSUE 6 FUNDING

Recommendation: The committee agreed that NSGCP needs additional funding to fulfill its potential. In the last decade, the purchasing power of the average research grant has declined by about one-half. A steady increase in funding is necessary if the program's potential contributions to the nation's economic and environmental health are to be realized. Any additional funds appropriated to NSGCP should be split between enhancement of meritorious state programs and support of new initiatives.

The committee recommends that the Under Secretary review the extramural funding programs within NOAA and develop means to help them function within an agency and department that are not oriented toward extramural funding. It might be necessary to adapt and/or adopt some of the granting processes of other agencies that fund extramural research activities.

The committee recommends that funding for NSGCP be reviewed by the Under Secretary in the context of Sea Grant's present condition and the national priorities on research and development, economic development, and education. It further recommends that, in the future, separate line items be proposed in the Sea Grant budget for state programs, regional programs, national research initiatives, SBIR, the cost of SGRP, and other NSGO administrative costs. The committee recommends that Sea Grant receive additional funding only if the complete package of recommendations proposed by the committee is implemented or the problems which the committee identified are eliminated.

The committee reiterates the loss of purchasing power that has been experienced by Sea Grant (see Figure 2) and notes that many Sea Grant activities coincide with high priorities of Congress and the administration. Any new funding added to the program should be tied to the Sea Grant strategic planning process. A large portion of any new resources should be dedicated to new initiatives. Increased appropriations will be needed if Sea Grant is to initiate international activities.

NSGO, in concert with state directors, should consider a new funding mode for new initiatives, i.e., not dividing new monies among a multitude of small grants to all state programs. Instead, new monies might be devoted to a smaller number of larger grants awarded to the best proposals from among state programs. These grants could emphasize multi-institutional regional projects. State programs should also be encouraged or required to devote a small percentage (5-10%) of their core program funds to integrated regional research, education, and outreach activities.

All six of the recommendations above must be implemented in order to improve Sea Grant's performance. Rapid implementation of these recommendations would help Sea Grant more efficiently manage its responsibilities and more wisely use any additional funds provided by Congress. If necessary improvements are not made, the committee suggests that Congress consider changes in the Sea Grant program and authorizing legislation. In this case, Congress might consider an alternate location for the Sea Grant program in order to ensure that the nation's marine science objectives are met.

Appendices

Appendix 1

Excerpt from the National Sea Grant College Program Act

Section 202 (33 U.S.C. 1121 (a-c))

(a) Findings

The Congress finds and declares the following:

(1) The national interest requires a strategy to—

(A) provide for the understanding and wise use of ocean, coastal, and Great Lakes resources and the environment;

(B) foster economic competitiveness;

(C) promote public stewardship and wise economic development of the coastal-ocean and its margins, the Great Lakes, and the exclusive economic zone;

(D) understand global environmental processes; and

(E) promote domestic and international cooperative solutions to ocean, coastal, and Great Lakes issues.

(2) Investment in a strong program of research, education/training, technology transfer, and public service is essential for this strategy.

(3) The expanding use and development of ocean, coastal, and Great Lakes resources resulting from growing coastal area populations and the increasing pressures on the coastal and Great Lakes

environment challenge the ability of the United States to manage such resources wisely.

(4) The vitality of the Nation and the quality of life of its citizens depend increasingly on the understanding, assessment, development, utilization, and conservation of ocean, coastal, and Great Lakes resources. These resources supply food, energy, and minerals and contribute to human health, the quality of the environment, national security, and the enhancement of commerce.

(5) The understanding, assessment, development, utilization, and conservation of such resources require a broad commitment and an intense involvement on the part of the Federal Government in continuing partnership with State and local governments, private industry, universities, organizations, and individuals concerned with or affected by ocean, coastal, and Great Lakes resources.

(6) The National Oceanic and Atmospheric Administration, through the national sea grant college program, offers the most suitable locus and means for such commitment and involvement through the promotion of activities that will result in greater such understanding, assessment, development, utilization, and conservation. Continued and increased Federal support of the establishment, development, and operation of programs and projects by sea grant colleges, sea grant regional consortia, institutions of higher education, institutes, laboratories, and other appropriate public and private entities is the most cost-effective way to promote such activities.

(b) Objective

The objective of this subchapter is to increase the understanding, assessment, development, utilization, and conservation of the Nation's ocean, coastal, and Great Lakes resources by providing assistance to promote a strong educational base, responsive research and training activities, broad and prompt dissemination of knowledge and techniques, and multidisciplinary approaches to environmental problems.

(c) Purpose

It is the purpose of the Congress to achieve the objective of this subchapter by extending and strengthening the national sea grant program, initially established in 1966, to promote research, education, training, and advisory service activities in fields related to ocean, coastal, and Great Lakes resources.

Appendix 2

Letter of Request



UNITED STATES DEPARTMENT OF COMMERCE
The Under Secretary for
Oceans and Atmosphere
Washington, D.C. 20230

November 29, 1993

Ms. Mary Hope Katsourus
Staff Director
Ocean Studies Board
National Research Council
2001 Wisconsin Avenue, N.W.
Washington, D.C. 20007

Dear Mary Hope:

I request the Ocean Studies Board conduct a review and evaluation of the National Oceanic and Atmospheric Administration's (NOAA) National Sea Grant College Program. The program is scheduled for Reauthorization so the National Research Council study would serve two purposes: 1) provide the basis for any needed changes in the program, and 2) provide the basis for NOAA working with the Congress on Sea Grant's Reauthorization. In order for the study to be used for Reauthorization, a final report should be delivered to me by June 1, 1994.

As the current Act states, the objective of the program "...is to increase the understanding, assessment, development, utilization and conservation of the Nation's ocean, coastal, and Great Lakes resources..." Therefore, in organizing and carrying out the review, I believe it important for the review to clearly recognize Sea Grant is not just a basic science oceanography research program, rather it is a broad marine program designed to address issues and solve problems by combining sciences, social sciences, and the transfer of knowledge and technology.

Your team assembled for this review should have the breadth to consider not only the traditional science disciplines in the context of marine program, but also such fields as aquaculture, marine biotechnology, economics, education, marine engineering, and marine policy. Because of severe budget limitations, and the limited time for the study, we will be looking for a proposal whose funding does not exceed \$100,000.00.

I and my staff, particularly Ned A. Ostenso and David B. Duane, will be pleased to work out details for the study with you.

Sincerely,

A handwritten signature in cursive script that reads "Jim".

D. James Baker

THE ADMINISTRATOR



Appendix 3

Committee Biographies

Arthur R.M. Nowell is a professor and director of the School of Oceanography, University of Washington. He earned a Ph.D. in 1975 from the University of British Columbia. Dr. Nowell has been a member of the Ocean Studies Board since 1990. His research interests include biological sedimentary dynamics, geophysical boundary layers, sediment transport, and oceanic particulate dynamics. Dr. Nowell chaired the committee and attended both committee meetings.

John E. Flipse is presently a marine engineering consultant. His most recent academic position was as a professor of engineering and director of the Offshore Technology Research Center at Texas A&M University. He earned a master's of mechanical engineering from New York University in 1948. Mr. Flipse spent a significant portion of his career (22 years) as a marine engineer in industry. He served as chair of the National Advisory Committee on Oceans and Atmosphere from 1985 to 1986. Mr. Flipse is a fellow of the Marine Technology Society and a member of the National Academy of Engineering. He attended the March 17-19 committee meeting.

Mary Virginia Hinchcliff is presently the education coordinator for the Rookery Bay National Estuarine Research Reserve in Florida, where she coordinates the reserve's activities related to teaching high school students, high school teachers, and environmental professionals. She earned a bachelor's degree in environmental education and marine sciences from Pennsylvania State University in 1980. Ms. Hinchcliff serves on the board of the Florida Marine Educators Association and is chairing a group working on a strategic plan for education for the

National Estuarine Research Reserve system. She attended both committee meetings.

John J. Manzi is presently the president and director of Atlantic LittleNeck ClamFarms (the world's largest molluscan aquaculture company) in South Carolina and is president of Aquaculture Technology Transfer, Inc. He also holds adjunct professor positions at Clemson University and the Medical University of South Carolina. He earned his Ph.D. in oceanography from the College of William and Mary in 1974. Dr. Manzi has provided consulting advice for the culture of scallops, clams, oysters, shrimp, and prawn in the United States and abroad. His research interests have concentrated in the area of clam genetics. Dr. Manzi attended both committee meetings.

Michael Orbach became a professor at Duke University in 1993, before which he was a professor of anthropology at East Carolina University. He earned his Ph.D. in cultural anthropology from the University of California at San Diego in 1975. Dr. Orbach serves as chair of the Marine Affairs Council of North Carolina and is a member of the North Carolina Marine Fisheries Commission. Dr. Orbach's research interests have focused on the cultural anthropology of marine fisheries and the use of anthropology in marine policy formation. He attended both committee meetings.

Leonard Pietrafesa has been a professor of oceanography at North Carolina State University (NCSU) since 1981 and is presently the chair of the Department of Marine, Earth, and Atmospheric Sciences at NCSU. He earned a Ph.D. in geophysical fluid dynamics from the University of Washington in 1973. His research interests are in the areas of estuarine and continental shelf processes, ocean circulation, geophysical fluid dynamics, western boundary currents, abiotic influences on fish recruitment and nutrient dynamics, and satellite oceanography. Dr. Pietrafesa attended both committee meetings.

Paul Stoffa is a Carlton Centennial Professor in Geophysics, Department of Geological Sciences, at the University of Texas at Austin. He earned a Ph.D. in geophysics from Columbia University in 1974. Dr. Stoffa became a member of the Ocean Studies Board in 1992. His research interests include marine geology and geophysics, applied seismology, and nonlinear optimization methods. Dr. Stoffa attended both committee meetings.

Andrew R. Solow is presently an associate scientist at the Marine Policy Center of the Woods Hole Oceanographic Institution. He earned a Ph.D. in geostatistics from Stanford University in 1986. He has been a member of the Scientific Working Group of the Intergovernmental Panel on Climate Change, the EPA Environmental Statistics Technical Advisory Committee, and the Scientific Steer-

ing Group of the Land-Ocean Interactions in the Coastal Zone project. Dr. Solow's research interests are in the areas of environmental statistics, Bayesian decision theory, and use of scientific information in policy making. He attended the February 24-26 committee meeting.

Karl K. Turekian is presently the Benjamin Silliman Professor of Geology and Geophysics at Yale University. He earned a Ph.D. from Columbia University in 1955. Dr. Turekian was elected to the National Academy of Sciences in 1984. His present research interests include marine geochemistry and the geochemistry of trace elements, and their use to study geological and geophysical processes. Dr. Turekian did not attend either committee meeting, but received all background materials and reviewed the draft report.

Appendix 4

Questionnaires

To expand the information available to the committee beyond its own expertise and experience, questionnaires were sent to the 29 state Sea Grant program directors, 85 National Association of Marine Laboratories (NAML) institutions, and 70 industry representatives. The committee evaluated the facts, ideas, and opinions contained in questionnaire responses and the background documentation listed in Appendix 5 as it formed its recommendations to improve the Sea Grant program. The quantitative responses elicited by some of the questions below were analyzed statistically and presented in the body of the report (e.g., see Figure 5).

DIRECTORS' QUESTIONNAIRE #1

1. What do you regard as the greatest achievements of your program and what limitations to further success do you face?
2. Are there any specific advantages from, or limitations to, your activities that are determined by relations within your state (or territory) or with the Sea Grant National Office that affect your operations within the environment of your state (or territory)?
3. How do you evaluate the various and differing components of your program? In other words, how do you justify continuation of your differing activities or decide that an activity should be discontinued or modified?
4. What background information do you believe our committee should receive to prepare them for the review and evaluation?

5. What are Sea Grant's roles in marine science in the United States, within your state or territory, and within NOAA? Is it fulfilling these roles?
6. Is appropriate research being funded, given Sea Grant's mission? Is the Sea Grant mission well articulated and communicated to potential recipients of Sea Grant funding, so that they can judge the relevance of their research to the Sea Grant mission?
7. How well is the Sea Grant concept working—funding basic research that is then transitioned into practical applications (i.e., how effective is the linkage between the research and Marine Advisory Service components of Sea Grant)?
8. Does the National Office provide your program with guidelines and standards for proposal review, and if so, are they adequate?
9. Should Sea Grant establish a science advisory panel?
10. How well does Sea Grant interact with other parts of NOAA?
11. Are there changes in the Land Grant College system that serve as a possible model for changes in the Sea Grant College System?
12. What changes do you propose or would you like to propose to your state program or to any other aspect of the National Sea Grant effort?
13. What proportion of your required matching funds come from your state versus private non-profit organizations versus industry?

Twenty-five out of 29 directors responded to this questionnaire.

DIRECTORS' QUESTIONNAIRE #2

1. How do you document and evaluate the successes of, and new opportunities for, your education, communications, and advisory activities?
2. What audiences do you target for your education, communications, and advisory activities and how do you determine the target audiences?
3. How do incorporate information about industry needs into your research, outreach, advisory, and education activities?
4. How do you determine if your program is "open" to all investigators in your state? What percentage of pre-proposals and or proposals do you decline before sending your omnibus proposal to the National Office?
5. What percent of your professional time is officially devoted to your position as a Sea Grant director?

6. Do you require match on a project-by-project basis or do you determine match on a program-wide basis?
7. Do you have restrictions on the use of your match (e.g., does a university matching partner restrict the use of its funds to match Sea Grant funding for proposals from that university)?
8. Have you ever funded research or outreach activities by a non-university entity?
9. What level do you report to in your university/consortium system and how is your performance as a Sea Grant College Program director evaluated within the system?
10. Do you receive either in-kind or financial contributions from industry?
11. What amount of pass-through funds did your program handle in the most recent year?
12. Do you under-report matching contribution from industry because of difficulties in the reporting and documentation requirements?

Twenty-two out of 29 directors responded to this questionnaire.

NATIONAL ASSOCIATION OF MARINE LABORATORIES QUESTIONNAIRE

1. How has Sea Grant benefitted your institution or the research and outreach programs within it?
2. What are the positive aspects of Sea Grant, from your perspective?
3. Is the Sea Grant mission well articulated and communicated to potential recipients of Sea Grant funding, so that you can judge the relevance of your research and outreach activities to the Sea Grant mission?
4. Is your research linked to Sea Grant Marine Advisory Service or education activities?
5. How well does Sea Grant interact with other parts of NOAA?
6. What changes should be made to your state program or to the national Sea Grant effort?
7. Is the existing proposal solicitation and review process adequate? If not, how would you improve it?
8. Do you believe that your state Sea Grant program has an open proposal

solicitation and review process and distributes funds among the institutions in your state equitably?

9. Do you have problems finding matching funds for the research and outreach project(s) you propose?
10. Does Sea Grant help your institution develop ties with industry and/or with the public?

Seventeen of 85 NAML institutions responded to this questionnaire.

INDUSTRY QUESTIONNAIRE

1. What type of interactions has your company had with Sea Grant, either through state programs or through the National Sea Grant Office?
2. How has Sea Grant benefitted your company?
3. Are the research and advisory service activities of your local Sea Grant program relevant to your company and to your industry?
4. Has your company participated in cooperative research with university scientists, funded by Sea Grant, to address industry needs?
5. Do you believe that industry participation in determining and ranking priorities of state and national Sea Grant research and outreach activities has been encouraged?
6. Have you ever contributed in-kind or other support as matching funding for a Sea Grant project?
7. Do you have any suggestions for improving the interactions of your company or industry with Sea Grant?

Sixteen of 70 industry representatives responded to this questionnaire.

Appendix 5

Documents Reviewed

- Council of Sea Grant Directors. *Roles of Sea Grant Partners*. Discussion document dated October 21, 1992.
- Council of Sea Grant Directors. *Some New Approaches to Decision-Making in the National Sea Grant College Program*.
- Department of Commerce. 1994. *NOAA—Summary of the President's Budget—Fiscal Year 1995*. Department of Commerce, Washington, D.C.
- Grace Commission. 1983. *President's Private Sector Survey on Cost Control*, Volume 9, pp. 143-144.
- National Association of State Universities and Land-Grant Colleges. 1993. *The National Sea Grant College Program*. A white paper prepared by the NASULGC Board on Oceans and Atmosphere, Washington, D.C.
- National Oceanic and Atmospheric Administration. *Strategic Plan, 1995-2005*. Department of Commerce, Washington, D.C.
- National Sea Grant College Network. *Economic Competitiveness and the Coastal Environment: Towards the 21st Century*. Maryland Sea Grant College Program, College Park, Maryland.
- National Sea Grant College Network. *Marine Biotechnology: Competing in the 21st Century*. Maryland Sea Grant College Program, College Park, Maryland.
- National Sea Grant College Program. *Compendium for the National Sea Grant College Program in Three Parts* (the "green book"). An unpublished procedures manual held by staff of the National Sea Grant Office and the state program directors.

- National Sea Grant College Program. 1993. *NOAA's National Sea Grant College Program, Fiscal Year 1994 Program Guidance*. National Oceanic and Atmospheric Administration, U.S. Department of Commerce, Washington, D.C.
- National Sea Grant College Program. 1993. *Sea Grant: Addressing Contemporary Marine and Coastal Issues*. National Oceanic and Atmospheric Administration, U.S. Department of Commerce, Washington, D.C.
- National Sea Grant College Program. 1994. *Inventory of Interactions Between the National Sea Grant College Program and Other Parts of NOAA*. National Oceanic and Atmospheric Administration, U.S. Department of Commerce, Washington, D.C.
- Office of Oceanic Research Programs. 1994. *Office of Oceanic Research Programs. A Guide to the National Sea Grant Office, the National Sea Grant Review Panel, the Office of Undersea Research, and the National Coastal Resources Research and Development Institute*. National Oceanic and Atmospheric Administration, U.S. Department of Commerce, Washington, D.C.
- Sea Grant Association. *The National Sea Grant College Program, 1987-1992*. Washington Sea Grant Program, Seattle, Washington.
- Sea Grant Review Panel. Minutes of the November 17-18, 1993 meeting.
- Sea Grant Review Panel. *Position Paper No. 1. Management of the Sea Grant College Program*.
- Sea Grant Review Panel. *Position Paper No. 2. Strategic Management*.
- Sea Grant Review Panel. *Position Paper No. 3. Sea Grant/Industry Partnerships*.
- Sea Grant Review Panel. *Position Paper No. 4. Costs of Panel Operations*.
- Sea Grant Review Panel. *Position Paper No. 5. Recertification of Sea Grant College Status*.
- Sea Grant Review Panel. *Position Paper No. 6. Administrative Costs of Sea Grant*.
- Sea Grant Review Panel. *Procedure Paper #1*.
- University of North Carolina Sea Grant Program. 1989. *The National Sea Grant College Program Economic Impact—1987*. Publication No. UNC-SG-89-01.

Appendix 6

Sea Grant Programs and Their Groupings

Group 1

Alaska
Maryland
Minnesota
North Carolina
New York
Louisiana

Group 2

Connecticut
Georgia
Massachusetts Institute of Technology
Puerto Rico
Ohio
Univ. of Southern California
South Carolina
Wisconsin
Woods Hole Oceanographic Institution

Group 3

Maine-New Hampshire
Mississippi-Alabama
Virginia
Washington
Delaware
Florida

Group 4

Michigan
New Jersey
Texas
Oregon
Rhode Island
Hawaii
Illinois-Indiana
California

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