

Sea Grant Research

A Report of the National Sea Grant Advisory Board

Prepared by the Committee to Review Sea Grant Research

August, 2009

Sea Grant Research

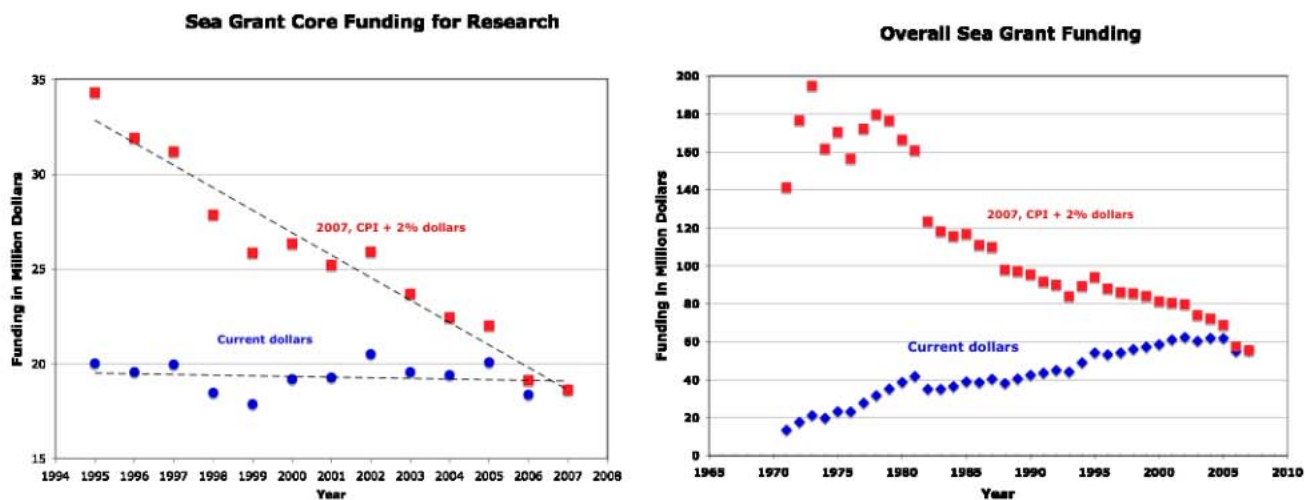
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Executive Summary

The National Sea Grant Advisory Board (NSGAB) was asked by the Director of the National Sea Grant College Program to address several issues of concern relative to research within the Sea Grant program. The primary concerns were related to a) the perception that the fraction of funds devoted to research within the overall program had been decreasing over the past decade, b) the impacts of such a change, and c) what could be done about this in the future. The Committee to Review Sea Grant Research was formed to address these issues and a more detailed charge that was given to the committee. This document is the report of that committee.

The combined research/outreach/education alliance of the National Sea Grant Program, executed by the state programs, is well recognized among the many programs in NOAA. The National Program has evolved from a federation of programs that addressed the overall NOAA Program mission, but with a focus on state needs, into the current model with a National Strategic Plan that has specific foci adhered to by the state programs. While it is too soon to evaluate the effectiveness of the new process, it is obvious that the research component of the Sea Grant Program faces major funding challenges. Funding of Sea Grant and its research has stagnated over roughly the last decade. However, the buying power for research funding (2007, CPI + 2% dollars) has declined by almost 50%, as shown below, whereas the buying power for Sea Grant's administration, education and outreach has declined by a smaller percentage. This leaves the research component of Sea Grant in an increasingly diminished position, unable to provide the new information required to respond to NOAA's national needs or to local outreach needs. Nevertheless, NOAA has not pushed for increased funding of Sea Grant as a whole among the other NOAA programs, and thus the decline in overall Sea Grant Program buying power has also decreased significantly since its inception, as also shown below.



This all leads to a fundamental perception of how Sea Grant and its portfolio serve the NOAA mission of service to America's coastal communities. Through a series of questionnaires to Sea Grant directors and NOAA laboratory directors as well as a number of interviews with Congressional, OMB, DOC, and NOAA staff and other interested individuals, insights were gained about both the effectiveness of Sea Grant and its research program and the overall funding problems that Sea Grant has had in recent years. Many findings and recommendations are outlined in this committee report, but the overall analysis clearly points to a need for a greatly improved appreciation of Sea Grant at the national level and a much greater integrated focus on critical national needs in the coastal environment. The status quo has not engendered this appreciation or this focus.

From our interviews and questionnaires the committee believes that the primary reasons for the current overall funding and research funding problems in Sea Grant can be summarized largely as follows:

Sea Grant is not seen as a national program with national goals, but as many small projects with little coherence.

Sea Grant research is not seen as being responsive in addressing emerging issues.

Sea Grant is not viewed as addressing the research interests that OMB sees as nationally important.

Some perceive Sea Grant research to be of lesser quality compared to top quality NSF research.

Sea Grant research is not seen as applicable to NOAA's mission.

There are various NOAA coastal programs with overlapping missions that are very successfully competing with Sea Grant for funding.

Research must continue to have a major role in Sea Grant. However, we believe that Sea Grant must integrate toward having a truly national research program. This must involve a vigorous effort to market Sea Grant's research efforts and demonstrate that they impact national issues in important, indeed fundamental ways. But more than that, there must be a clear focus of Sea Grant's research effort on a few critical issues of national importance and concern in the coastal environment.

In considering these overall funding problems of Sea Grant, the way in which Sea Grant has operated over the past several decades, and the impressions that we have gained from responses to our questionnaires and to our interviews, the committee believes that it is worthwhile to consider possible new models for Sea Grant and its research. Several different models are explored in this report, with advantages and disadvantages indicated for each. However, the committee believed that it was not constituted nor charged to finalize this type of necessary analysis or to make recommendations as to just what path should be taken. A carefully and appropriately constituted task team will need to be formed to develop a fully informed assessment of this kind.

- **Recommendation:** The NSGO, the NSGAB, the SGA, and NOAA should form a Task Team to initiate detailed discussions on the approaches to developing a stronger national focus for Sea Grant such that its success, and therefore increased research and overall funding, can be achieved. Considerations should include, among other actions, efforts to align with NOAA's regionalization of its programs, increased emphasis on critical coastal research needs that serve the nation while preserving some level of research that serves local needs, and a consideration of ways to improve the mechanism for handling the research portfolio.

Our preliminary analysis suggests that, whichever model is chosen, it should in the end result in the following:

Sea Grant will be perceived as a national program with national goals addressing a small number of clearly defined national needs that are determined jointly by the programs and NOAA, and possibly OMB and Congress.

Sea Grant will be recognized for its high quality research that makes major impacts.

Sea Grant research will be effective in addressing new and emerging issues.

The research needs of the individual state programs will still be met.

State programs will continue to receive funding for outreach and education programs.

NOAA will become an active and effective champion for Sea Grant.

Sea Grant research will be clearly applicable to NOAA's mission, with increased interaction with other NOAA programs whose overall missions are different from that of Sea Grant.

Overall administrative costs and reporting requirements will be minimized.

The committee also addressed issues that could enhance Sea Grant's research efforts, including the future value of Sea Grant research, how it should be evaluated, and ways in which an individual program's research portfolio can be expanded. For example, linking Sea Grant to NOAA initiatives and promoting the idea that Sea Grant could serve as a vehicle for NOAA offices for managing and recruiting their extramural funding portfolio should have a high priority. However, considerable concern was evident that Sea Grant and the rest of NOAA have not worked well together in the past. NOAA has not been seen as an effective champion for Sea Grant. The Sea Grant directors believe that real collaboration will never be possible until the rest of NOAA accepts the need for stakeholder engagement in the research process. At the same time Sea Grant is part of a mission-based agency with a mandate beyond pure science for its own sake. Furthermore, for the collaboration to become meaningful, all must recognize that Sea Grant is a true partnership, not wholly owned by NOAA or by universities.

- **Recommendation:** NOAA must find ways to better utilize the strengths of Sea Grant, such as engaging and implementing the user/clientele-oriented research, joint funding on certain cross-cutting initiatives, sharing facilities, and looking for niches to utilize Sea Grant strengths.

- **Recommendation:** Sea Grant needs to develop more meaningful partnerships with the NOAA laboratories and increase and improve efforts to communicate the impacts and value of Sea Grant research to the rest of NOAA. Forging partnerships would allow Sea Grant programs to be the vehicle for managing extramural research projects that are selected on a peer-reviewed competitive basis and would enhance research opportunities. Science workshops among Sea Grant and the NOAA laboratories should also be held to discuss ongoing and future research findings and collaboration.

- **Recommendation:** NSGO must be more aggressive in:
 - a) promoting the contributions of Sea Grant to all levels of NOAA. One way to do this is to engage a larger number of NOAA's managers and scientists in the proposal review process for research and extension; and
 - b) demonstrating that America's universities are an unequalled science, technology and human resource that, through Sea Grant, can be applied to NOAA's mission.

The interviews raised another issue that contributes to the funding difficulties of Sea Grant. This is the number of coastal programs within NOAA. The reasons cited for these new programs are numerous. The reasons notwithstanding, the results are obvious. There are too many programs with unclear mission statements, some redundancy in purpose, all subject to continuing expansion of their missions, and competing for a relatively small amount of money. The competition for funding diminishes the capability of each in addressing national and local needs. As presently structured, these programs risk competing with others to the point that the overall good and the ability of meeting national objectives of each is diminished.

Strengthening regional partnerships and approaches to collaborative research should be encouraged and could lead to significant new funding and results. Regional partnerships can address issues that are larger and more complex than those in a single state, and national issues can often be more easily approached on a regional scale. Regional partnerships can provide excellent opportunities for involvement with other NOAA entities as well as various federal and state agencies, and this would follow NOAA's intent for regionalization in its overall programs.

- **Recommendation:** Regional partnerships among Sea Grant programs and other entities are an appropriate approach for producing significant new results that address important regional and national issues. Increased partnerships within a state with governmental and private sources are also strongly encouraged.

Aligning research programs with areas whose importance is clearly going to grow in the future is a sensible approach. Examples include climate-related research, marine transportation issues, alternative energy sources in the marine environment, and human dimensions research.

- **Recommendation:** Research programs should be aligned to address critical issues that will arise in the future.

The committee believes that research remains the foundation of the Sea Grant program upon which the outreach and education programs exist. This is true both at the national level and at the level of state programs. A percentage goal for the amount of research relative to other components of a Sea Grant program has been generally accepted as a mechanism to level the efforts of the diverse programs. Historically it has been ~50%. However, the ability to reach 50% has been hampered recently by the shrinking value of the dollars received by individual programs and extension program mandates from the NSGO. States with a smaller overall budget often find it very difficult to reach the 50% level, and this "recommended" percentage hampers their flexibility to develop all parts of a program. Ideally a program should develop a research effort that makes the most impact relative to the national goals of Sea Grant as well as important issues to the state and its stakeholders.

- **Recommendation:** The percentage of a particular program's funding devoted to research should be flexible, although a target of 50% is appropriate for most programs. However, the particular goals of an individual program must be considered. Given this flexibility, there must be realistic, tractable and understandable metrics for research performance.
- **Recommendation:** Because some programs are too small to be able to designate a significant fraction of their funding to research, consideration should be given to combining the research activities of these smaller programs with neighboring or related programs so that all state programs can realize the research benefit.

Traditionally the most common metrics that have been utilized for assessing research performance in Sea Grant are peer-reviewed publications, patents, presentations, degrees granted, type and quality of placement of students supported, etc. Nevertheless, the committee believes that the assessment of the impacts of Sea Grant research in the future is of more importance in evaluating the contribution of a program to a national effort. For example, the incubation of new industries and start-up businesses as a result of Sea Grant research and the contribution of Sea Grant research to the sustainable development of coastal and marine resources, addressing socio-economic issues affecting productivity or the health of coastal ecosystems, and the impact on policy and lawmaking are all important measures of impact. Another important metric of the value of Sea Grant research is comprised of the human resources who are trained in research projects and who work in NOAA and universities in support of NOAA's mission, and with other national and local environmental and resource management agencies.

- **Recommendation:** Assessing the impact of Sea Grant research, e.g., contributions to sustainability, improving regulatory policies, changing behavior, creating industries, etc. should have a high priority in future evaluation of Sea Grant research. In addition, the human resources, together with all publications and other research products deriving from funds administered by the Sea Grant Program, regardless of whether or not some of the funding came from sources other than Sea Grant core funding, should be considered in this evaluation. The contribution of core Sea Grant funding relative to other sources should also be monitored and reported.

As part of the overall evaluation process, a significant effort has been undertaken recently by the SGA to encourage programs to send in their peer-reviewed publications to the Sea Grant Library. This study has shown that there appears to be no decline in such publications despite a decline in buying power of core Sea Grant funded research, at least up through the 2004-funding year. It is not clear how these data should be interpreted. One possibility is that the lack of a decline in output reflects the success of the programs in leveraging their core Sea Grant research funding with other federal, state, and private resources. These data should continue to be updated. This effort will also provide accurate information to outside interests about the productivity, value and extent of Sea Grant research.

- **Recommendation:** Individual Sea Grant Programs should continue to submit peer-reviewed publications to the Sea Grant Library so that an up-to-date record of these publications is constantly available. Some mechanism should be devised to evaluate the relative contribution of Sea Grant vs. other funds obtained by state programs to the overall productivity of Sea Grant researchers.

Many Sea Grant programs believe that their administrative burdens have been increased by more research reporting from both the NSGO and their university.

- **Recommendation:** Every effort should be made to minimize and reduce duplicative and unnecessary reporting requirements.

I. Introduction

A. Charge to the Committee

Throughout the existence of the National Sea Grant College Program research has been a central and prominent part of the Sea Grant model's focus on research, outreach and education. In the summer of 2008 the Director of the National Sea Grant College Program, Dr. Leon Cammen, asked the National Sea Grant Advisory Board to address several issues of concern relative to research within the overall Sea Grant program. The primary concerns were related to a) the perception that the fraction of funds devoted to research within the overall program had been decreasing over the past decade, b) the impacts of such a change, and c) what could be done about this in the future. The Committee to Review Sea Grant Research was formed to address these issues. The specific charge given to the committee was as follows:

- 1) What are the long-term implications of the decrease in Sea Grant research funding? Has the decline been across the board, or has it affected some programs or some programmatic areas more than others?
- 2) What are the reasons for this decline? What is the perceived impact and value of Sea Grant research relative to research in other NOAA programs, and what effect has this had on the decline in Sea Grant Research funding? In what way should the Sea Grant research portfolio complement, and be distinguished from, NOAA's portfolio, and with the portfolios of other coastal and marine funding agencies?
- 3) What can Programs do to maximize the value of their research effort and support the best university scientists? What can Directors do to engage the best talent? Is there a role for the National Office in this effort? What are the manpower implications of actually managing an effective research effort, both for the Programs, and for the National Office?
- 4) Is the continuation of the percentage guidelines for funding devoted to research still warranted? If so, should the percentage directed toward research vary between large or small Programs? What is the appropriate balance between research and outreach?
- 5) On what basis should research performance within the Sea Grant Program be evaluated and measured in the future? Should state and other research support for individual Sea Grant Programs be considered when evaluating the overall research effort?
- 6) Can the decline in research funding be reversed? If so, how? What pathways can be explored to expand a Program's research portfolio?

B. The Committee's Approach

In response to this charge our report addresses several aspects of research in Sea Grant, with emphasis on the decline of buying power, its impact on Sea Grant programs, and steps that Sea Grant has taken or could take to mitigate the impacts of this decline. We also suggest a process that could lead to modifications of the current Sea Grant model that might stimulate additional funding for Sea Grant. The committee's first task was to ascertain the extent of the problem relative to research itself, i.e., how much funding had been devoted to Sea Grant research and how had it changed over the years. This turned out to be a difficult problem. In addition, the committee recognized very early that any decrease in research buying power was clearly related to the general decline in the buying power of Sea Grant funding in general, and that the extent and reasons for that decline needed to be addressed as well.

As part of its fact-finding activities, the committee developed two different questionnaires addressing many of these issues. One was sent to all of the directors of the Sea Grant programs. The other was directed to a number of NOAA laboratory directors in OAR, NMFS, and NOS. Finally, a series of interviews was held with Congressional, OMB, DOC, and NOAA staff, and other interested individuals. The responses to these questionnaires and interviews have been synthesized by the committee and will be discussed later in this report. The blank questionnaires are presented in Appendices A and B, and the list of the interviewees and the questions asked of them are presented in Appendix C. Syntheses of the responses to these questionnaires and interviews are presented in Appendices D, E, and F respectively. A summary of a brainstorming effort the committee undertook to look at the advantages and disadvantages of the present Sea Grant model and alternative Sea Grant models is presented in Appendix G. Membership of the committee is given in Appendix H.

The committee held several conference calls during its deliberations. We also held two full meetings - in Washington, DC on 22-23 September 2008 and in Honolulu, HI on 19-21 January 2009. Several members of the committee met at other times as well, notably in Baton Rouge, LA on 11-12 November 2008, and in Washington, DC on 9-12 February 2009. A preliminary set of conclusions and recommendations was presented to the National Sea Grant Advisory Board at its meeting in Washington, DC on 11 February 2009, and a draft of the final report to the Board at its meeting in Seattle, WA on 27 August 2009.

This report is organized around the committee's response to the six charge points outlined above. Chapter II addresses the trends in funding for research within the Sea Grant program and the implications of these trends. That chapter then considers the trends in the overall funding of the Sea Grant program. Chapter III addresses the causes of the overall buying power decline for Sea Grant, considering in particular the viewpoints provided by the Sea Grant directors, the NOAA laboratory directors, and those from outside Sea Grant and the NOAA labs. The committee then provides some strategies for the future in this area. Chapter IV addresses ways in which Sea Grant can maximize the value and quality of Sea Grant research, considers guidelines for the future fraction of funding devoted to research, addresses the evaluation of research in the future, and considers ways in which individual Sea Grant programs can expand their research portfolio in the future.

II. The Overall Funding Problem

Charge #1

What are the long-term implications of the decrease in Sea Grant research funding? Has the decline been across the board, or has it affected some programs or some programmatic areas more than others?

A. Trends in Sea Grant Funding for Research

1. The NIMS Data and Program Data on Research Funding

Unless indicated otherwise, research funds reported in this report refer to core Sea Grant funds. They do not include any National Strategic Investments (NSIs) (which are Sea Grant funds, but not considered core funds), earmarks or pass-through funds (earmarks and pass-through funds are not considered Sea Grant funds because they do not originate from Sea Grant appropriations). Information on total research funding handled through the NSGO, as recorded in NIMS, is presented in Appendix I.

Before the questions addressed in the charge can be answered properly, we must determine accurately what the decrease in Sea Grant research funding (as opposed to total Sea Grant funding, which will be discussed in Section II.C) has been over time. In fact, this has not been an easy task! The initial data obtained for research funding were from the National Information Management System (NIMS). NIMS data have several shortcomings for this study.

NIMS records reflect proposed, rather than actual, spending of funds obtained from Sea Grant's omnibus and other grant proposals. There are some cases in which NIMS does not correctly report the amount of proposed spending on research. This can result from simple entry errors in the proposal itself, or in the transcription of information from the proposal to NIMS, so the wrong amount of funding, or the wrong Project Type (Research, Management, Extension, Education, Communication) is recorded in NIMS. However, the NIMS database has now been extensively validated, and it is believed that this type of error has been minimized for the data used in this analysis.

In addition, proposed research projects that also fund extension components, education projects that fund research components, or any other project that splits funding across more than one Project Type cannot be captured exactly by NIMS, because NIMS allows only one Project Type to be recorded per project. The Project Type is assigned by the Program using a standardized project numbering system in its omnibus proposal (a research project has a project number that always begins with "R", for example).

Proposed funding on a project as recorded in NIMS does not always match actual funding spent, as reported by the programs. There are several possible reasons for this, which could be happening simultaneously. These include:

a) Sea Grant programs generally include a program development (PD) project in their omnibus proposals, which NIMS categorizes as Project Type "Management". Some of these funds are ultimately used to support research PD projects. However, in the past, NIMS has not always captured these research projects.

b) Omnibus grants typically span four years and include many individual research projects. Grant rules usually allow programs to change the timing of the individual projects anywhere within the grant period. Thus, programs have been able to move execution dates of individual projects, even across years,

without notifying NSGO. If a research project was moved back one year, for example, and a non-research grant was moved forward one year, the total research funding actually expended for those years would not match the proposed research funding (although this should not change the totals over the entire grant period).

c) As long as the work performed matches the work plan in the omnibus proposal, it is possible under certain circumstances for programs to adjust the amount of money expended on individual projects within a single omnibus grant. If programs adjust the funding on their research projects without notifying NSGO, NIMS would not capture this adjustment.

For all the above reasons, although the NIMS data can give a good sense of the funding for research, there is significant concern on the part of both the committee members and the Sea Grant directors that NIMS research funding data may differ from what the programs themselves have recorded for research spending. To determine the size of this difference, the directors from each Sea Grant program were asked by the Sea Grant Association (SGA) to provide accurate data on the amount of funding for research in their programs over the past several years. For the purpose of this analysis, “research” was defined as peer-reviewed, competed research, including funding for students for dissertation research supported by Sea Grant. No earmark funds were included.

Twenty-four Sea Grant programs (or about 75%) provided data on research funding for the years 2006, 2007, and 2008. The programs reported two types of research funding:

- 1) Research that is supported by core funding provided through the National Sea Grant College Program; and
- 2) Research that is supported by all funding from whatever source (e.g., state, local and private), other than Sea Grant. Information on research funded by non-core Sea Grant (e.g., NSIs) is reported separately.

To determine the fraction of a program’s effort that is devoted to research using these data, the total funding for a program was defined in two ways and was also provided by these 24 programs:

- 1) Total core funding provided through the National Sea Grant Office, but excluding funding for outreach initiatives (e.g., coastal community development) that were added to the core budget but were not accompanied by additional research funding; and
- 2) Total program funding from all sources (e.g., federal, university, state, local, private), but excluding funding for outreach initiatives (e.g., fisheries extension, coastal community development, etc.) that were added to the core budget but were not accompanied by additional research funding.

There were indeed observed differences between what programs themselves reported as Sea Grant core research spending and what was recorded in NIMS. The differences were in general small, as discussed below. Error analysis is continuing, but examples of causes for the differences include those issues described above, as well as differences in the extent to which graduate education was characterized as research, differences in deciding whether or not projects with research and non-research components would be reported as research, and (legal) redistribution of Sea Grant core and non-Federal match funding among individual projects within the omnibus grant.

Unfortunately since only 75% of the programs were able to provide data and since only three years of program data were available, it is not possible to develop trends from these program data. However, the committee felt that if it could be shown that the total core research funding data from NIMS and that from the programs were similar for the 24 programs and for the years 2006 and 2007 (2008 data are not yet available from NIMS), this would give confidence that the trends shown by the NIMS data are representative of the actual amounts spent by the programs and can thus be used to evaluate trends in this report. Considering only core research funding, the differences between the NIMS data and the program data for 2006 and 2007 are shown in Table 1. The committee decided that this agreement of ~10% between the two sets of data provided us with the confidence to use the NIMS data to evaluate trends in research core funding.

<u>Difference between Program and NIMS Data for Core Research</u>	
Year	Percentage Difference
2006	9.2%
2007	10.3%

The programs also provided valuable information on the amount of extramural research funding obtained by the programs, i.e., all funds not provided by the NSGO dedicated to research. This included federal, state and private grants and donations. Figure 1 shows a comparison of Sea Grant core funding with research funding obtained externally by the programs for the years 2006, 2007, and 2008. It is clear that the external funding is approximately the same or greater than the Sea Grant core funding for those years, indicating the very strong and successful efforts that are being undertaken by the Sea Grant programs to augment their core research funding. It would be very valuable to continue to keep records of this external funding and, if possible, to include it within the NIMS database in the future.

2. Trends Shown by the NIMS Data

On the basis of the results shown in Table 1, the NIMS data are used below to evaluate trends in Sea Grant core funding. The National Sea Grant Office has provided guidelines indicating what portion of Sea Grant funding should be used for research, and it is useful to look at these guideline statements over the past decade. In 1998 the guideline stated, "Approximately 50 percent of the federal funding for the program core will be distributed for research and education projects awarded competitively." In 2003, the guideline stated, "Approximately 50% of the federal funds (excluding program enhancement awards and NSIs) allocated to program core funding must be allocated to peer-reviewed, competitive research and to graduate/undergraduate education proposals." Finally, the 2005 PAT manual indicated, "It is expected that as an operating guideline, not less than 45% or more than 65% (ca. 50%), of base plus merit funding (federal portion) will be distributed for research and education projects awarded by an open, peer-review competitive process."

Sea Grant Core and External Research Funding

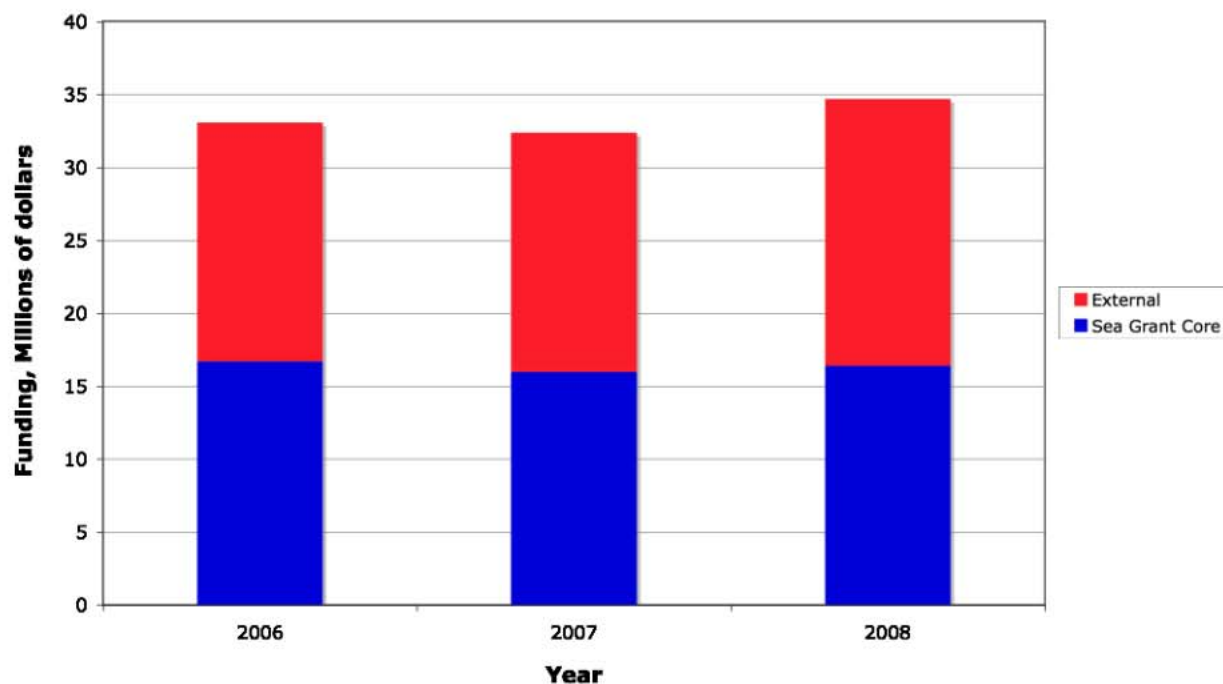


Figure 1. Sea Grant core and external research funding, as reported by the programs to the SGA.

Figure 2 presents data from NIMS that show the change in the percentage of core funding for research from 1995 to 2007. This figure includes 1996, 2002 and 2006, which were years when Sea Grant changed start dates for some of the programs. During those years, the programs received all their research funding, but less than their full complement of funding for non-research projects (e.g., 12 months research funding, but only 10 months administration and outreach), thus skewing the percent research upwards. Removing those years provides a somewhat higher r^2 value ($r^2 = 0.6822$ vs. the 0.5327 in Figure 2, which also shows a dashed red line representing a linear least squares regression on all the data). Figure 2 shows that there has been a gradual decrease in the percentage of core funding utilized for research since the early 1990s, although since 1999 there has been no significant trend (see the solid blue regression line for 1999-2007; $r^2 = 0.1117$). Throughout the period of the chart, the percentage is below the value of roughly 50% that has been used as a guideline in recent years.

Percentage of Core Funding for Research (from NIMS)

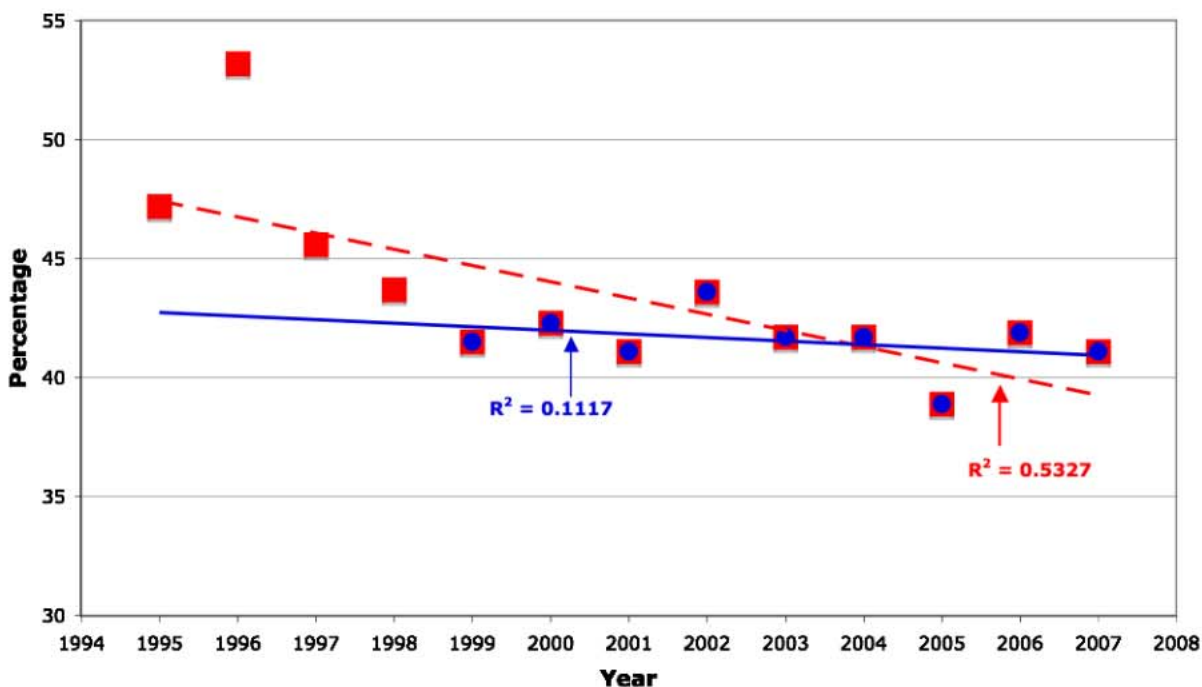


Figure 2. Percentage of core Sea Grant funding devoted to research, from NIMS data. Dashed regression line for all data, solid line only for 1999 to 2007.

Figure 3 shows the core funding devoted to research since 1995 in current dollars (i.e., dollar values for the year in which the funding was granted), and it is apparent that that funding has remained essentially constant. However, Figure 3 also shows funding presented as 2007 dollars, with the additional consideration of 2% inflation on top of the consumer price index (CPI). The "CPI + 2%" is probably a good estimate of the real inflation that has affected the Sea Grant budget over the years. Reports on "scientific" or "R&D" inflation in the engineering and biomedical areas tend to show numbers a couple of percent over the base inflation rate. This is primarily due to new equipment, competition-driven salaries, etc. Based on the general knowledge of the growth of starting salaries, ship-time costs, and lab set-up costs, we believe that marine science inflation is at least as high as general "scientific" inflation. These data show that the buying power in 2007 dollars of research funding, just like that for overall Sea Grant funding shown in a later figure, has been decreasing markedly and regularly in recent years.

Sea Grant Core Funding for Research (from NIMS)

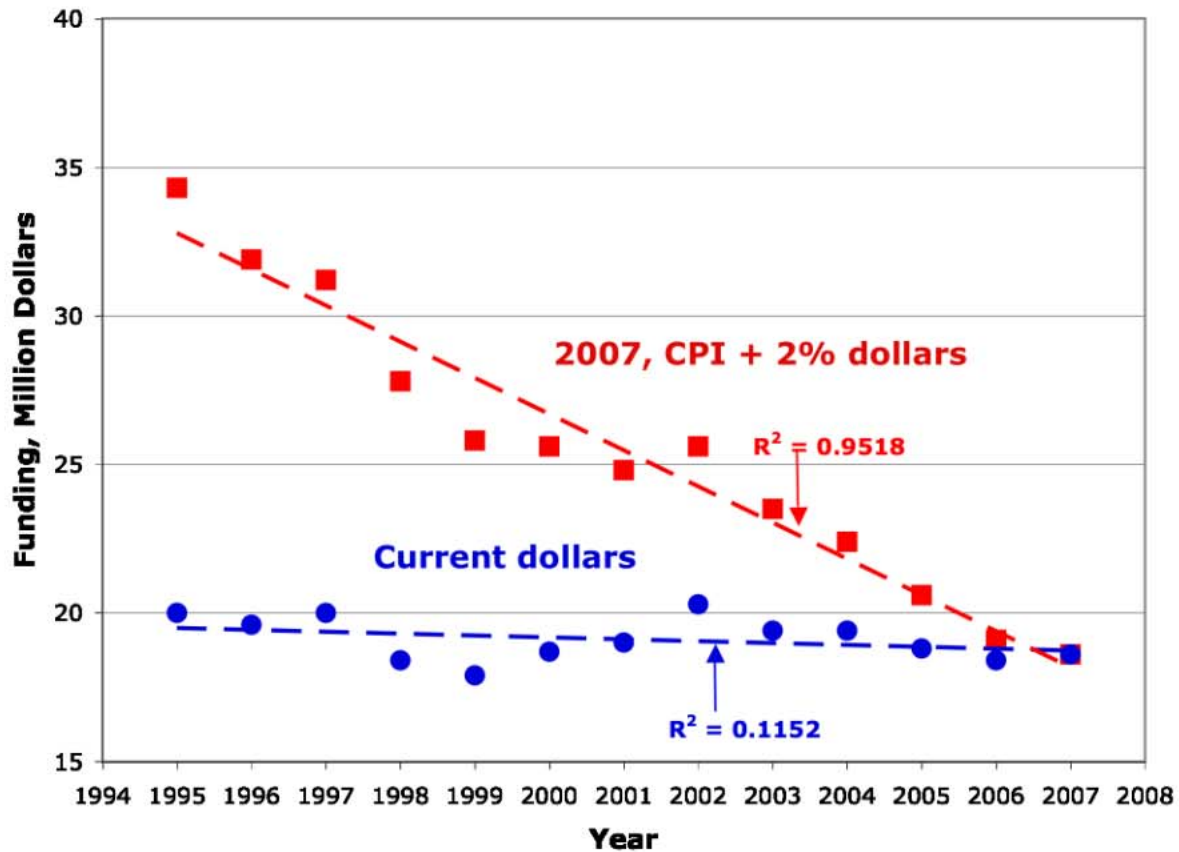


Figure 3. Sea Grant core funding for research, in current and 2007 dollars, from NIMS data. Dashed lines represent linear least squares regressions on the data.

Figures 4 and 5 show the core funding for the different major categories in Sea Grant, both in current and in 2007 dollars. These numbers include the Coastal Community Development (CCD) funding. CCD funding was an additional \$50,000 in Sea Grant core funds provided to programs beginning in 2001, in return for their commitment to invest in coastal community development activities. Figure 4 reflects current dollars, whereas Figure 5 uses CPI + 2%. In Figure 5, note that in 2007 dollars the other categories have decreased from 1995 to 2007 to 63% to 72% of their earlier values, whereas research has decreased much more, to almost 50% of its 1995 value.

Sea Grant Core Funding, Current Dollars from NIMS

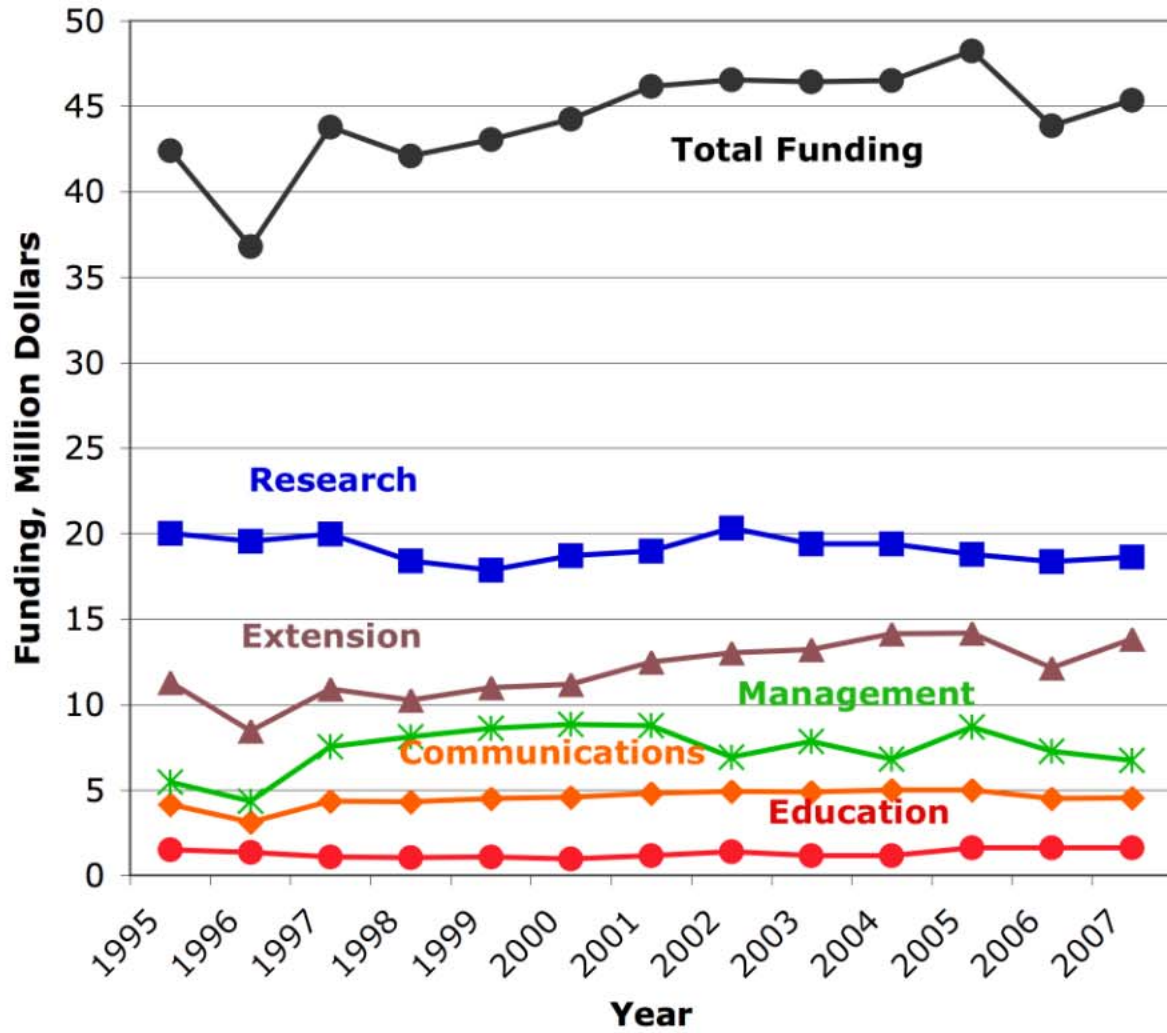


Figure 4. Sea Grant core funding devoted to research and other categories in current dollars, from NIMS data.

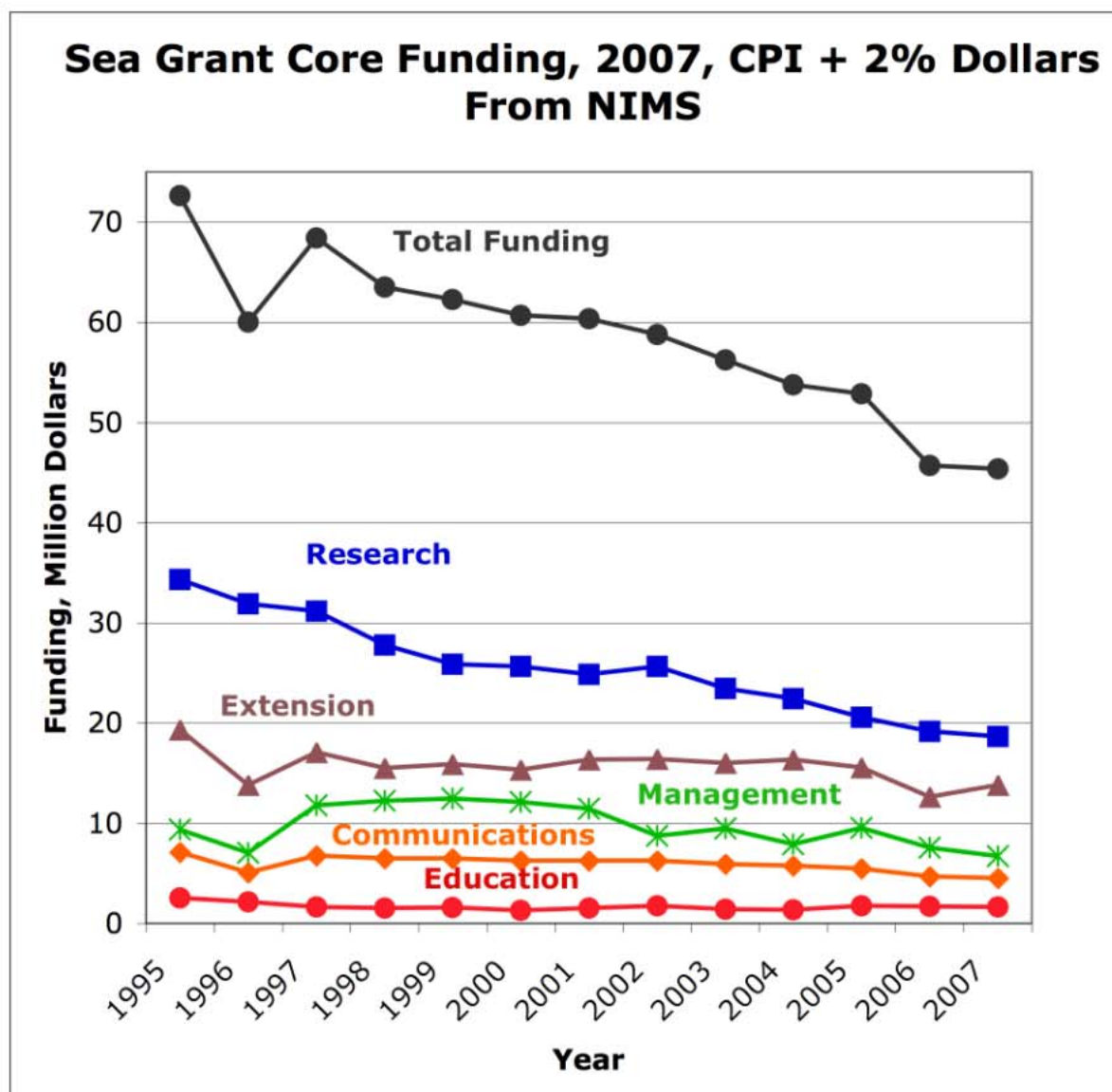


Figure 5. Change in buying power of Sea Grant core funding (2007, CPI + 2% dollars) devoted to research and other categories, from NIMS data.

3. Other Indicators of Research Funding

While the dollar figures show clearly that the buying power of research in the core Sea Grant budget has been decreasing, a similar trend is also found if we look at the number of research projects awarded across the Sea Grant Program each year. A plot of this from 1995 to 2006 is shown in Figure 6, where the dashed line represents a linear least squares regression on these data. The number of projects awarded has decreased from about 400 in the mid 1990s to about 300 by 2006. This appears to be a good proxy for the loss of research buying-power. If the dollar value of projects increases to accommodate inflation and there is no corresponding increase in available funding, the number of projects must decline. This decrease in project number is thus consistent with a decrease in buying power of Sea Grant research dollars.

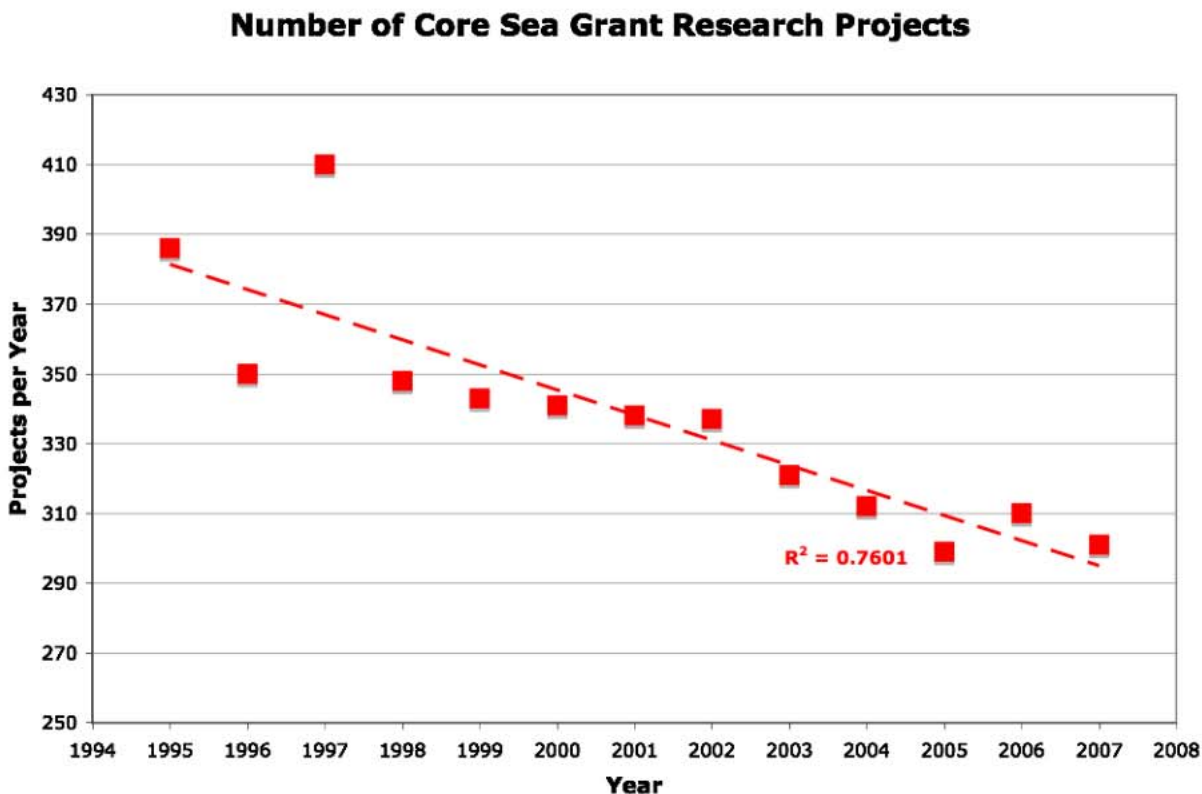


Figure 6. The number of Sea Grant core research projects funded each year.

One might assume that peer-reviewed publications would also decrease with decreasing research dollar buying power. However, from the data we presently have available this does not appear to be the case. Figure 7 shows a compilation of peer-reviewed publications from the Sea Grant Program, as compiled by the Sea Grant Library working with the Sea Grant Association. A major effort was made recently by the SGA both to encourage programs to send in their reprints to the Sea Grant Library and to carefully screen those publications such that only peer-reviewed publications would be listed. Initially this major effort only requested papers published through 2004. However, recently the individual programs were asked to provide information on all peer-reviewed scientific publications from 2005 to the present. Some of these newer data are now available and are shown in Figure 7, and all new data up to the present should all be available by early fall, when Figure 7 will be updated.

This valuable compilation does show clearly the productivity of Sea Grant researchers funded through Sea Grant programs. It also shows that through 2005 there is no clear evidence that there has been a decrease in research publications since the early to mid-1990s, even though the buying power of Sea Grant research funding had decreased and the number of Sea Grant funded projects has declined. We also note that research papers may be published some years after the grant period, as there is a normal lag between funding and publication of papers. This consistency of research output may well reflect the leveraging of funds from other sources besides the core Sea Grant program, such as NSIs and funds obtained externally by the individual programs. This should be clarified and the effort should be continued to determine whether or not this productivity in the face of declining buying power has continued. This will also provide accurate information to outside parties about the value and extent of Sea Grant research.

The number of Sea Grant peer-reviewed publications is one important measure of the productivity of Sea Grant research. Missing from these data, however, is an indication of the quality of this research.

Comments received during the course of this study suggest that this question is of more than passing interest to some decision makers. To best address this issue, the committee feels that determination of the times a Sea Grant funded research publication is cited in the professional literature would be of value. Future studies should ascertain this measure.

All publications reported by state programs

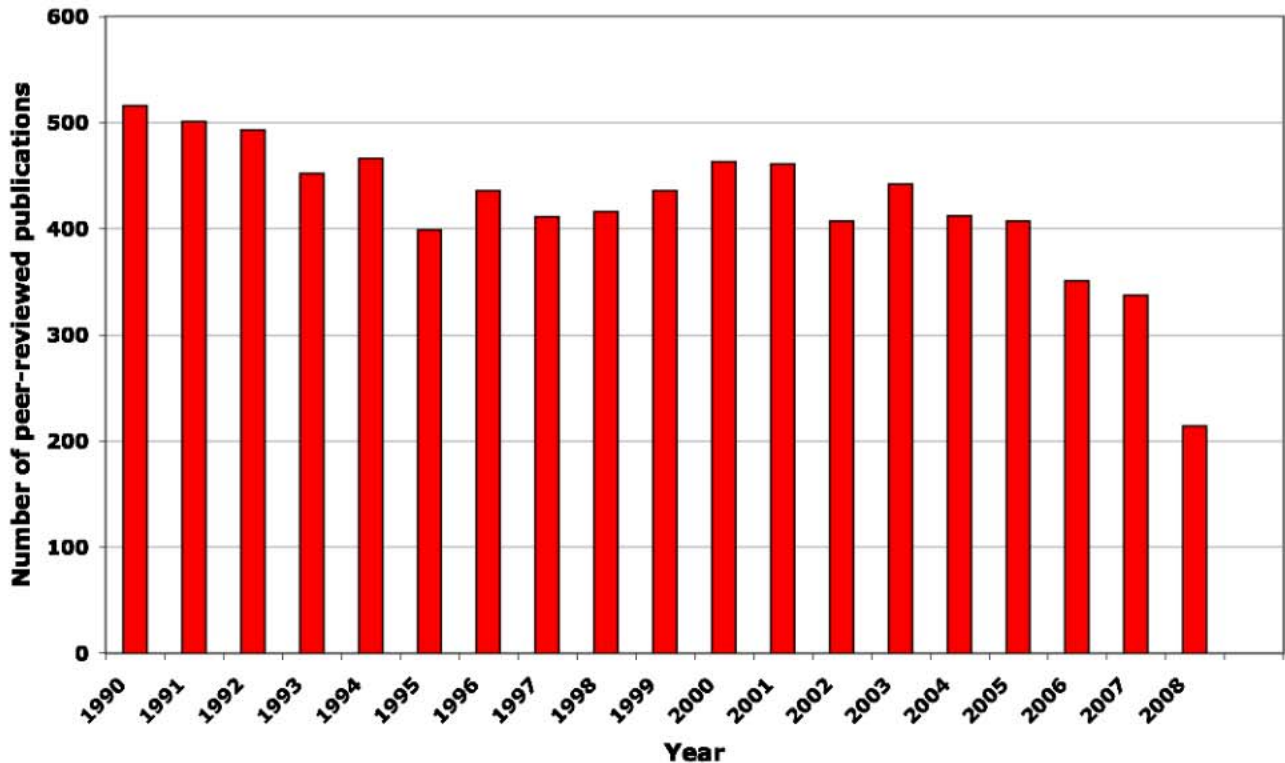


Figure 7. Sea Grant peer-reviewed publications from 1990 to 2009 as reported by the state programs, August, 2009

- Recommendation:** Individual Sea Grant Programs should continue to submit peer-reviewed and other publications to the Sea Grant Library so that an up-to-date record of these publications is constantly available. Some mechanism should be devised to evaluate the relative contribution of Sea Grant vs. other funds obtained by state programs to the overall productivity of Sea Grant researchers.

4. Summary - Funding for Research

In terms of current dollars, Sea Grant core research funding has remained fairly constant from 1995 to 2007. However, due to inflation, the buying power of this research funding has decreased by ~50% over this same time period. The percentage of total Sea Grant core funding devoted to research has decreased overall from 1995 to 2007. However, from 1999 to 2007 there has been no significant decrease in this percentage, although the percentage has remained well below 50%. The decrease in research buying power is reflected by the funding of approximately 25% fewer Sea Grant research projects in 2007 than in the mid-1990s. It is noted that because funding in the other major categories of Sea Grant (e.g., extension, management, communications, and education) has done a better job of rising with inflation,

the core funding buying power in these categories has decreased much less than has research. At least through 2005, peer-reviewed scientific publications by Sea Grant investigators have not decreased, possibly reflecting the successful leveraging of funds for research from external sources by the individual Sea Grant programs.

B. Implications of these Research Funding Trends

Valuable information on the implications of these trends to the research efforts within Sea Grant was obtained from the questionnaire sent to all Sea Grant directors (see Appendix A). Virtually all of the 27 program responses agreed that the decline in buying power was real and due to essentially flat federal funding and rising costs of salaries, fringe rates, indirect costs, graduate student stipends, tuition, travel, and supplies. In some cases programs had protected research by moving staff to state funds. As they pointed out, the only “easy cut” is to research. At many programs the current acceptance rate is far lower than NSF for projects, with much less money than NSF. Most programs reported that they have been reducing the number of projects funded through core funding (as shown in Figure 6) and some are capping the size of grants. It is believed that Sea Grant is losing credibility as a funding source for coastal research and that it is losing its ability to attract the best PIs because of high “transaction costs” and the small size of grants. Several programs felt that there is a trend to fund only beginning scientists who are less expensive. Another concern is that there may be pressure to fund less expensive social science and demonstration projects rather than more expensive physical and natural science research. For small programs the decline in ability to fund research is particularly acute. One program funded seven research projects in the ‘06-‘08 omnibus; four in ‘08-‘10 and predicts two in ‘10-‘12 and only one in ‘12-‘14. Total research in this program for the next two years is budgeted at \$100K.

In terms of buying power, essentially every program indicated that their buying power has gone down. Some programs have been able to “buffer” their Sea Grant research against cuts and inflation by reallocating state funds or acquiring more state funds. However, this is “not sustainable” if the core funds continue to stay flat or decline further. Many programs have been successful in leveraging Sea Grant funds to obtain additional funds from state and other federal sources. While commendable, there are several problems here as well. The first is that the current budget crisis in many coastal states will have a sharp and immediate impact on programs that have come to rely heavily on the “leveraging” of state resources. The more subtle problem is that Sea Grant will come to “own” less and less of what “it” funds. At what point does the local Sea Grant office become a “job shop”? At what point does a program become a pipe through which other monies flow?

In summary, the implications for reduced buying power for research and for individual programs are the same as those for Sea Grant as a whole shown in Figure 8 below – loss of credibility as a serious funding source, decline in student support, major reductions in the number of projects funded, lack of ability to respond to stakeholders, loss of innovative capacity, inability to attract senior PIs, etc.

C. Trends in Total Sea Grant Funding

The committee believes that issues related to the amount of research funding are intimately associated with the decreasing buying power for Sea Grant as a whole. Underlying this report are data showing the decline in Sea Grant funding, both research and non-research. These data are reproduced from the recent presentation given by Dr. Ross Heath at the 2007 Sea Grant Week in San Diego, CA. His report highlighted clearly the striking decline of Sea Grant buying power over the years. Figure 8 (derived from Dr. Heath’s presentation) shows the appropriated funding for Sea Grant in current year dollars (i.e., the year the funding took place). It also shows those figures presented as 2007 dollars, with the additional consideration of a 2% inflation on top of the consumer price index, as was done for the

research dollars in earlier figures. An indisputable fact is that, in terms of real buying power dollars, funding for Sea Grant has been in a steady decline for the past two decades or more. The buying power of Sea Grant funding has decreased dramatically over the lifetime of the Sea Grant College Program, such that the current buying power is only about one third of what it was in the early 1970s. Clearly a continuation of this trend would be fatal to a viable and healthy Sea Grant program.

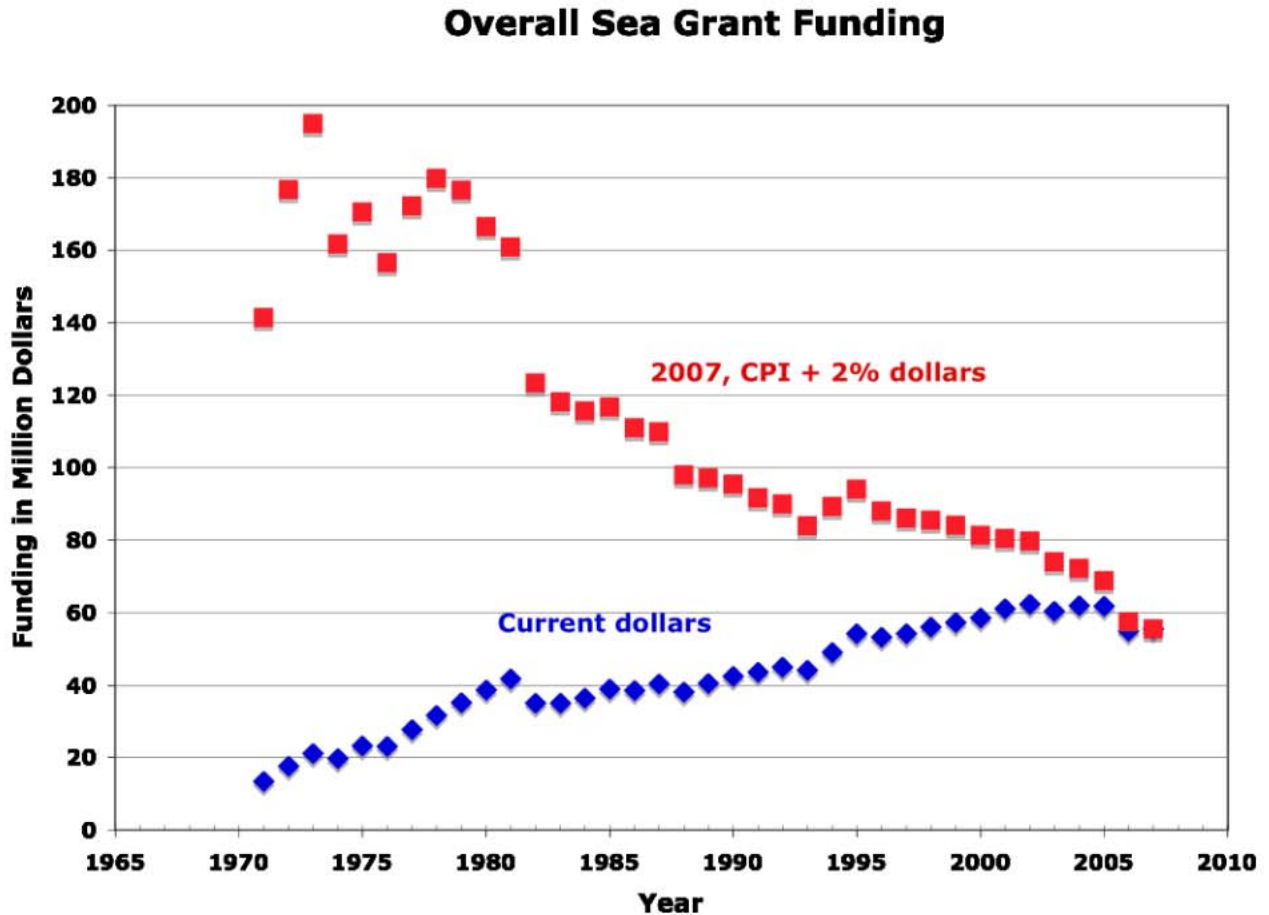


Figure 8. Overall Sea Grant funding in millions of current year dollars and in 2007, CPI + 2% dollars

III. Addressing the Funding Problem

Charge #2

What are the reasons for this decline? What is the perceived impact and value of Sea Grant research relative to research in other NOAA programs, and what effect has this had on the decline in Sea Grant Research funding? In what way should the Sea Grant research portfolio complement, and be distinguished from, NOAA's portfolio, and with the portfolios of other coastal and marine funding agencies?

A. Causes of the Decline

The committee has spent considerable effort in attempting to ascertain the reasons for this lack of growth and actual decline in Sea Grant funding and buying power. Our response to Charge 2 was aided by a questionnaire to the Sea Grant directors, a different questionnaire to the NOAA Laboratory directors, and a series of interviews with persons (in current and previous positions) representing Congressional staff, the Office of Management and Budget, NOAA and Department of Commerce budget offices, senior managers in NOAA, and agencies outside of NOAA but possessing knowledge of Sea Grant (see Appendices A, B, and C). The syntheses of the comments from both the questionnaires and the interviews are included in Appendices D, E, and F. Questionnaires were sent to all 32 Sea Grant directors. Twenty-seven of these responded (84%). For the NOAA laboratories, questionnaires were sent out to 8 directors of OAR laboratories, 4 directors of NOS centers, and 16 directors of NMFS centers and laboratories. The response from those directors was 62%, 50%, and 25% respectively. A summary of the views of each of these groups follows.

1. The View of the Sea Grant Directors

From the answers received, the Sea Grant directors view the relationship with the rest of NOAA differently than the NOAA Laboratory directors view their relationship with Sea Grant. This is not unexpected. The Sea Grant directors feel that the Sea Grant College Program is under-appreciated in NOAA. They challenge this under-appreciation by citing the strong points of Sea Grant programs: 1) flexibility of Sea Grant in responding to the needs of the stakeholders; 2) ability to recruit some excellent university scientists to work on projects of coastal relevance, 3) integration of research and outreach; 4) demonstration of stakeholder commitment through local match, and 5) a source of a highly trained workforce for NOAA and other federal agencies. The directors believe that through the strategic plans, Sea Grant is integrated into the mission and goals of NOAA and that every project funded by Sea Grant furthers the NOAA missions and goals. They also view NOAA as being remiss in not using Sea Grant as a tool for more effectively engaging the American university community, acknowledged universally to be the best research enterprise in the world.

There is a sense among the Sea Grant directors that collaboration between Sea Grant and the rest of NOAA can and should be enhanced. Examples mentioned include having Sea Grant: 1) assume a larger role in engaging and implementing the user/clientele-oriented research; 2) administer national research initiatives; 3) serve as a facilitator for engaging the university community and other funding agencies for national projects; and 4) co-share facilities or resources. Furthermore, they believe there should be more thought in identifying complementary roles for both Sea Grant and the rest of NOAA. For example, Sea Grant is ideally suited to bring a local and regional consciousness to national efforts. In part this can be advanced by improved awareness of NOAA research interests throughout Sea Grant while emphasizing the range and depth of Sea Grant research, thus demonstrating the contribution of Sea Grant to the goals and missions of NOAA.

There are those within the Sea Grant directors, however, who believe that only limited opportunities exist for improved relationships between Sea Grant and the rest of NOAA. They argue that the rest of NOAA will need to undergo a “sea change” before it can see Sea Grant as a partner. In the past NOAA as a whole has shown little interest in leveraging Sea Grant strengths to the betterment of NOAA or the nation. Rather NOAA has treated Sea Grant as insignificant. Some believe that real collaboration will never be possible until the rest of NOAA accepts the need for stakeholder engagement in the research process and begins to value risk-taking in research sponsorship. On the flip side, they suggest that Sea Grant must accept that it is part of a mission-based agency and that NOAA is not a pure science-based agency like NSF. Furthermore, for the collaboration to become meaningful, Sea Grant must move away from the concept that it is a program wholly owned and directed by universities.

2. The View of the NOAA Laboratory Directors

The NOAA Laboratory directors are of two minds in their assessment of Sea Grant and opportunities for enhanced collaboration. The OAR and NOS laboratory directors who responded are generally impressed with the potential for collaboration and partnering in the areas of research, education and extension. However, even though they state willingness for collaboration, there are only a few examples of such collaboration ongoing. The Center for Sponsored Coastal Ocean Research (CSCOR) cites four cooperative programs: Brown-tide research initiative on Long Island, NY; 1996-2002 Pacific Northwest Coastal Ecosystem Regional Studies; the Coral Reef Ecosystem Studies; and the Caribbean Coral Reef Institute cooperative agreement with the University of Puerto Rico’s Department of Marine Sciences. The Pacific Marine and Environmental Laboratory cited collaboration in evaluating tsunami hazards in small harbors. The Atlantic Oceanographic and Meteorological Laboratory credits Sea Grant in helping further the South Florida Ecosystem Restoration project. The National Severe Storms Laboratory mentions the value of Sea Grant in linking radar rainfall estimates with runoff models and with biological and pollution models in estuaries and coastal areas. Though not certain from the responses, the impression is that with the exception of the CSCOR activity, much of this collaboration is outreach, rather than research. One of the directors sees increased collaboration as a vehicle for their scientists to seek reimbursable funding from Sea Grant.

The small sample of directors from the National Marine Fisheries Service who responded, with one notable exception, did not share the OAR and NOS directors’ enthusiasm for Sea Grant. In one area, the collaboration between Sea Grant and NMFS scientists includes helping develop the scientific basis of managing various fishery resources, such as trophic dynamics of squid, bio-economics of rockfish, and acoustic tracking of salmonid fishes. This collaboration is blunted somewhat with the impression that Sea Grant is focusing too much of its marine research on the basic end of the research continuum that garners support by academia, but not from the larger end of the user community. Furthermore, while recognizing the value of Sea Grant extension, the NMFS director believes that Sea Grant devotes too much effort to the areas of biodiversity, climate change, and sustainability issues at the expense of more traditional interaction with commercial and recreational fisheries.

The other NMFS Laboratory directors who responded see Sea Grant of limited value, with one viewing Sea Grant as a competitor for funding and others seeing Sea Grant as of no impact or only occasionally useful. The more generous see Sea Grant as a potential, but currently undeveloped partner. One area of potential collaboration is the utilization of Sea Grant research in applied fisheries and ecosystem management, such as restoration of ESA-listed salmonid fisheries, providing information to the Fisheries Management Councils and promoting the common goal of sustainable fisheries. These directors see collaborative research being hindered because NOAA scientists are required to bring their

own funds. Similar to the NOS director, the NMFS directors would like to be able to compete for Sea Grant funding. Doing so would enhance collaboration with Sea Grant.

There were a few areas where agreement was found between the OAR, NOS, and NMFS directors. One such area is that of discipline-focused workshops. The value of these workshops would provide cross-fertilization of talent and ideas for addressing problems, discussing commonalities and avoiding overlaps. They see the value at both the research level and the program level. Three of the NMFS directors did question the value of such a workshop.

Two other points emerged from the questionnaire sent to the NOAA Laboratory directors. Even though the Knauss Fellows program was not part of the questions, some of the directors mentioned this as a program that works. Second, few of the directors recognize Sea Grant as a source of highly trained personnel.

A question unanswered from the responses from either the Sea Grant or the NOAA Laboratory directors is why, after nearly four decades, the Sea Grant model has not been accepted and utilized within the rest of NOAA. Significant collaboration has yet to take root.

3. The View from Outside of Sea Grant and the NOAA Laboratories

Those persons interviewed outside of the Sea Grant and NOAA laboratory network gave a view of Sea Grant funding difficulties with a perspective different from either the Sea Grant or the NOAA laboratory directors. Individuals interviewed included representatives from the House of Representatives (both current and previous staffers from the Natural Resources Committee and Science Committee); Office of Management and Budget (both current and previous); Department of Commerce and NOAA Budget office (current); senior NOAA management (both current and previous); and persons who have knowledge of Sea Grant from the perspective of other agencies (see Appendices C and F).

From this broad representation we expected to receive a wide range of opinions. While that proved to be the case, there were also some important recurring themes. Many of those interviewed from the Hill, previous OMB examiners, and NOAA believed that OMB has a deep and long-standing bias against Sea Grant, especially Sea Grant's research. They believed that the recognition of this bias by NOAA has influenced NOAA not asking for additional funding for Sea Grant. NOAA believed that any request for additional Sea Grant funding would not be well received, which has resulted in NOAA beginning new programs in areas where Sea Grant has expertise. OMB and the DOC budget office expressed the view that NOAA has not requested additional funding for the past several years, perhaps due to the desire to protect in-house research at the expense of extramural research. According to OMB, NOAA has failed to make a case for Sea Grant research being of a high priority at the national, state, or local level.

When shown the funding graph developed by Ross Heath (Figure 8) demonstrating Sea Grant funding to be in a steady decline for the past 20 years, representatives from OMB/DOC believed that the interpretation is skewed by what was or was not included. They offered that:

- a) If the big ticket items (e.g., satellites) were removed from NOAA's budget and only ORF (Operations, Research, and Facilities) were considered, the Sea Grant budget would look similar to the overall NOAA budget; and
- b) If funding for the coastal ocean programs were also considered, the funding profile would be much different than presented. Except for the past four or five years, little drop off in funding for coastal issues would be found.

The key to the funding for Sea Grant obviously rests with the funding side of the Administration and Congress. This includes the budget offices of NOAA and the Department of Commerce, OMB, and the Appropriation committees in both House and Senate. The budget offices in NOAA and DOC take their lead from OMB. Congress generally has limited money to add substantially to a program's budget, and this is especially true in an era of reduced earmarks. As a result, the real key to successful funding ultimately rests with OMB. The interviews provided some insight as to the attitude of OMB toward Sea Grant, both from comments of current and previous OMB/DOC/NOAA budget office staff, and from comments of those persons interviewed from the Hill, senior positions in NOAA, and other agencies, all of whom have substantial knowledge of OMB.

OMB expressed a concern about overlap among the numerous coastal ocean programs within NOAA. The lack of a clear distinction among the research missions of these programs was cited as a problem with Sea Grant funding. Without clear definition, there is a probability of mission and funding overlap. The competition for funding diminishes the capability of each in addressing national and local needs. As presently structured, these programs risk competing with others to the point that the overall good and the ability of meeting national objectives of each are diminished. With the formation of each new coastal program in NOAA, there is a new line item in the budget. When building the budget, the money is allocated to the program most closely identified with a research task; other organizations lose out. Building a budget is a bottom-up process. According to OMB, NOAA must first take the initiative and request new funding. In the past several years, NOAA has not done this for Sea Grant. There may be a tendency in NOAA to protect in-house research at the expense of extramural research. Or it may be part of a question raised over the years of whether Sea Grant is supporting national priorities or it is a collection of local programs. The NOAA budget is presented as a total initiative, but how Sea Grant fits into this budget is often lost.

Of the two previous OMB examiners interviewed, one said that OMB is concerned about the nimbleness of Sea Grant in addressing emerging issues and the type of research OMB wants. Sea Grant is viewed as doing a good job at solving local and state problems, thus ensuring that existing funding will be maintained. However, its perceived failure to address national problems is an impediment for increased funding. Sea Grant is not seen as a problem-solver on the national level because it is not positioned to address national issues. There is a lack of coherence with "hundreds of mosaic tiles, without the big picture." The beneficiaries are thought to be a large number of small local-type programs rather than the nation as a whole. Sea Grant has not adequately integrated the impacts of its research to a national scale.

It is also thought that OMB and the Appropriators view Sea Grant as an entitlement program or a pass-through program to the states to do whatever they want. Hence, Sea Grant funding is viewed more like an earmark than a competitive program. On at least one occasion an individual has stated that Sea Grant is not a national program, prompting OMB to ask "then why are federal dollars being spent on state and local programs and what national benefit is being gained from Sea Grant?" There is a sense at OMB that whenever these issues are raised the Sea Grant attitude has been "send money and leave us alone."

There are other perceptions that compound the problem of Sea Grant's funding. OMB has not viewed Sea Grant's research as stellar science but rather as being static, without the nimbleness to address emerging scientific issues (despite the fact that virtually all Sea Grant research proposals are now subjected to rigorous external peer review). Some on the Hill (and elsewhere) perceive that the amount of funding to individual Sea Grant programs is due as much to timing as to merit. For example, those programs in existence from the early days of Sea Grant are thought to get more funding than the newer Sea Grant programs. It is felt by some that NOAA has very little flexibility in its budget and tends to view Sea Grant with ambivalence and as a small program that is doing some nice things but is of a low

priority in terms of funding. Others in NOAA view Sea Grant as a competitor for limited research dollars.

Sea Grant's extension efforts are widely praised by everyone interviewed. The criticism is that NOAA is under-utilizing this outreach effort. This strength, which is under-emphasized by Sea Grant, is ideally positioned to complement other NOAA activities and should be an essential means of extending the results of NOAA research. Unlike Sea Grant's research, OMB recognizes the lead role that Sea Grant plays in outreach, and believes that this capability should be further capitalized by Sea Grant recasting itself to focus on outreach.

Some raised the issue of the location of Sea Grant. One of those interviewed expressed the opinion that Sea Grant is an orphan within NOAA and does not fit well within OAR. In a fairly recent study of NOAA's ocean programs, it was recommended to move Sea Grant to NOS. Sea Grant, however, indicated that it is a research-based program and would not fit well within NOS; therefore it did not move. The person interviewed believes that the failure to move was a mistake. Others argue that merging Sea Grant with the NOS Center for Sponsored Coastal Ocean Research (CSCOR) would be beneficial to both programs. We note that both NOS and CSCOR also fund external research.

Some of those interviewed felt that the individual lobbying by the Sea Grant Association has been a serious problem in the past. The SGA is occasionally seen as being self-serving and not a team player, although this impression has been decreasing in recent years. They believe that this may be part of the reason for NOAA not being more supportive of Sea Grant.

The current approach of Sea Grant research funding decisions being made at the local (state) level has caused one senior official to question whether the Sea Grant research best serves the NOAA mission and whether funds in the current state program model are being well utilized. Others remark that Sea Grant research is not well connected to the NOAA mission and is generally ignored by NOAA. Several interviewees believe that Sea Grant research would fare better if it were directed by NSGO. They see a loss of message and relevance for the program at present. These individuals believe that if research were handled at the national level, there would be a better-defined connection of Sea Grant research and outreach activities to national issues and to the mission of NOAA. Others caution that should the research decision be moved to the federal level, protective steps must be taken to ensure state priorities are not lost.

In summary, from our interviews it appears to us that the primary reason Sea Grant has not fared well in funding is that it is seen more as an entitlement program addressing the needs of individual states than a national program. Sea Grant has been unable to change this perception over many years. Also, by failing to request increased funding, NOAA has not been an effective champion for Sea Grant. Rather, new coastal programs, of a perceived national scope, have been established, and these new programs are competing successfully with Sea Grant for funding. With the addition of numerous coastal programs, OMB is concerned that inadequate distinction exists, resulting in duplication and inefficiency of funding and overlap of missions. The applicability to the NOAA mission of research funded by Sea Grant is frequently questioned. As now managed, there is little influence of Sea Grant research at the national level and the wisdom of the investment of taxpayer's money is questioned.

Sea Grant must find ways to demonstrate clearly its impact to the nation as well as the local community. There has recently been some discussion that this can be done through the number of publications prepared by Sea Grant researchers. Some of those interviewed believed that this would only appear to compete with NSF and could prove to be counter-productive. Rather, Sea Grant should concentrate on its impact in meeting national needs. It is much easier to generate funding support for a program whose research is clearly serving needs than one simply doing research. Also, Sea Grant must

get its supporters more engaged in singing the virtues of the program. With few exceptions, the universities do not lobby for Sea Grant. This counters the impression that stakeholders are committed to the success of Sea Grant. Sea Grant must be sold as a national program and as an integral part of NOAA's outreach and research.

Those interviewed indicated that Sea Grant needs to show that it is more than the sum of its parts, something it has until now been unable to do. Certainly the new Sea Grant Strategic Plan, which aligns its goals with those of NOAA and requires each state Sea Grant program to align its own strategic plan and goals with the national strategic plan, is a move in the right direction. That plan focuses its efforts in four areas of national concern: healthy coastal ecosystems; sustainable coastal development; a safe and sustainable seafood supply; and hazard resilience in coastal communities. Our committee supports strongly the recent suggestion by the Futures Committee that an excellent national focus for Sea Grant should be adaptation to climate change in the coastal zone. Focusing its national effort on one, or very few issue(s) and carrying out that effort in a coordinated and well-managed way would send a clear message that Sea Grant is a national program addressing critical needs.

B. Strategies for the Future

The synthesis above of the interviews with individuals knowledgeable about Sea Grant and the budget process in Washington begs the question if the current Sea Grant model is working. Sea Grant funding is stagnant. While the extension program being conducted in each coastal state is universally praised, Sea Grant research is challenged. In addition, the level of funding for Sea Grant research has decreased in certain programs to the point where its relevance is questioned. On the basis of the discussions in the previous section we believe that the primary reasons for the current overall funding problems in Sea Grant can be summarized as follows:

Sea Grant is not seen as a national program with national goals, but as many small projects with little coherence.

Sea Grant research is not seen as being responsive in addressing emerging issues.

Sea Grant is not viewed as addressing the research interests that OMB sees as nationally important.

Some perceive Sea Grant research to be of lesser quality compared to top quality NSF research.

Sea Grant research is not seen as applicable to NOAA's mission.

NOAA is not seen as an effective champion for Sea Grant.

There are various NOAA coastal programs with overlapping missions that are very successfully competing with Sea Grant for funding.

In considering these overall funding problems of Sea Grant, the way in which Sea Grant has operated over the past several decades, and the impressions that we have gained from responses to our questionnaires and to our interviews, the committee believed that it was worthwhile to consider possible new models for Sea Grant and its research or perhaps ways in which the current model could be made more effective. Thus we attempted to "think outside the box" in our deliberations on these issues.

In this exercise we considered six different possibilities in addition to maintaining the current Sea Grant model. These six new approaches included:

Maintaining the basic current model but undertaking a major effort to aggregate and synthesize Sea Grant research outputs and their impacts.

Regionalization of all aspects of the Sea Grant Program;

Maintaining current Sea Grant programs for outreach and education but handling research grants at a regional level;

Maintaining current Sea Grant programs for outreach and education but handling research grants at a national level;
 Elimination of research in Sea Grant in order to concentrate on its universally recognized strength of extension; and
 Increasing the funding of Sea Grant research at the expense of outreach.

For each of these approaches, and the current Sea Grant model, we considered advantages and disadvantages. That analysis is presented in detail in Appendix G. These six additional models span a wide range of approaches - from important fine-tuning of the present model to a major overhaul of the research management (even including the possibility of managing the research program centrally in Washington), to the extreme of eliminating research in Sea Grant entirely. Obviously in evaluating which of these approaches would be best for Sea Grant in the future, one would need to determine which would most effectively overcome the overall funding hurdles outlined above. This would be a very complex and important calculation, and this committee was not constituted nor charged to make this type of necessary analysis or to make recommendations on just what path should be taken. A carefully and appropriately constituted task team will need to be formed to develop a fully informed assessment of this kind.

- Recommendation:** The NSGO, the NSGAB, the SGA, and NOAA should form a Task Team to initiate detailed discussions on the approaches to developing a stronger national focus for Sea Grant such that its success, and therefore increased research and overall funding can be achieved. Considerations should include, among other actions, efforts to align with NOAA's needs and with regionalization of its programs, increased emphasis on critical coastal research needs that serve the nation while preserving some level of research that serves local needs, and a consideration of ways to improve the mechanism for handling the research portfolio.

Our preliminary analysis suggests that, whichever model is chosen, it should in the end result in the following:

Sea Grant will be perceived as a national program with national goals addressing a small number of clearly defined national needs that are determined jointly by the programs and NOAA, and possibly OMB and Congress.

Sea Grant will be recognized for its high quality research that makes major impacts.

Sea Grant research will be very effective in addressing new and emerging issues.

The research needs of the individual state programs will still be met.

State programs will continue to receive funding for outreach and education programs.

NOAA will become an active and effective champion for Sea Grant.

Sea Grant research will be clearly applicable to NOAA's mission, with increased interaction with other NOAA programs whose overall missions are different from that of Sea Grant.

Overall administrative costs and reporting requirements will be minimized.

Research must continue to have a major role in Sea Grant.¹ However, we believe that Sea Grant must move much more toward having a truly national research program. This must involve a vigorous effort to market Sea Grant's research efforts and the impacts they have had on national issues. But more than

¹ The committee does not believe that research should be eliminated, as one of the hypothetical models above suggests.

that, there must be a clear focus of Sea Grant's research effort on a few critical issues of national importance and concern in the coastal environment. NOAA must recognize that Sea Grant is a valuable resource and use it by developing meaningful ties between Sea Grant and all other parts of NOAA, especially the research laboratories. The future Sea Grant model should continue to have its current excellent extension programs managed at the state level, but there should be a concerted effort to integrate these activities with other parts of NOAA.

IV. Enhancing Sea Grant Research Efforts

The last four charges given to the committee addressed various issues that bear upon the future value of Sea Grant research, how it should be evaluated, and ways in which a program's research portfolio can be expanded. The committee drew extensively on the responses to the questionnaire that was sent out to all Sea Grant directors addressing these issues. That questionnaire is given in Appendix A, and syntheses of the responses by the directors to questions related to this charge are given in Appendix D. The remainder of this chapter addresses these last four charges given to the committee. While the discussion below is largely based on an assumption that research would be handled administratively in a manner somewhat similar to how it is done now, most of the issues raised here are relevant no matter what final model is chosen for Sea Grant research.

A. Maximizing the Value and Quality of Sea Grant Research

Charge #3

What can Programs do to maximize the value of their research effort and support the best university scientists? What can Directors do to engage the best talent? Is there a role for the National Office in this effort? What are the manpower implications of actually managing an effective research effort, both for the Programs, and for the National Office?

Obviously providing more funding so that the success rate for research grants would be higher and increasing the size and number of individual grants would help to bring the very best scientists into the Sea Grant program. Nevertheless, there are also other means of accomplishing this. Directors should actively and continuously recruit the best talent. Fair, open, peer-refereed competitions certainly will help, and this is now common throughout the Sea Grant Program. Mini/program development grants can also provide the means for attracting new investigators and engaging young investigators with mid-career established investigators. Connecting scientists more closely to non-university stakeholder and interest groups, such as communities, non-profits, or small business groups to identify potential research projects can be very beneficial, and having an effective and desirable extension program to offer as partners to stakeholders that adds value and credibility to the research project, the researcher and the portfolio can also be quite attractive to excellent researchers.

As outlined in Sections IIIA1 and IIIA2 above, there is a belief that collaboration between Sea Grant and other parts of NOAA can and should be enhanced and that there are a number of ways that NOAA can better utilize Sea Grant's university research strengths. The development of significant new partnerships between Sea Grant and NOAA laboratories should be an important way of maximizing the value and quality of Sea Grant's research. An often-cited example for a good first theme is the impact of climate change on fisheries. Nevertheless, for this partnership to be successful, both NOAA and individual Sea Grant programs must accept that Sea Grant is a synergistic partnership of a mission-based agency with America's universities that engages stakeholders in the research process and values risk-taking in research sponsorship.

Communicating and demonstrating the value, impact and success of Sea Grant research to the other parts of NOAA is a critical role that the NSGO should play. NSGO will need to synthesize research outputs and impacts and communicate these in a compelling way to other NOAA offices and across the network and nationally if partnerships of the type mentioned above are to occur. NSGO is currently attempting to involve Knauss Fellows with this task. The upper management of NOAA may be hearing this message but the rest of NOAA has not yet appropriately valued the need for increased collaboration.

But this is a two way street, and NSGO needs to help Sea Grant programs become much more informed about ongoing research within NOAA. Linking Sea Grant to greater NOAA initiatives and promoting the idea that Sea Grant could serve as a vehicle for NOAA offices for managing and recruiting their extramural funding portfolio should have a high priority. The NSGO could pursue partnerships and jointly fund research initiatives with other agencies that may share mission, goals and objectives (e.g., NSF and the Smart Growth relationship with EPA). To do this more extensively, NSGO personnel would need to be redirected to some extent from present activities. With the current staffing shortages within the NSGO, it is difficult to see where significant new time could be devoted to this issue. However, if a serious effort is undertaken to work much more closely on research issues with other NOAA programs and laboratories, serious consideration should be given to expanding the NSGO staff to perform this management, education and partnership-forming process.

- **Recommendation:** NOAA must find ways to better utilize the strengths of Sea Grant, such as engaging and implementing the user/clientele-oriented research, joint funding on certain cross-cutting initiatives, sharing facilities, and looking for niches to utilize Sea Grant strengths.
-
- **Recommendation:** Sea Grant needs to develop more meaningful partnerships with the NOAA laboratories and increase and improve efforts to communicate the impacts and value of Sea Grant research to the rest of NOAA. Forging partnerships would allow Sea Grant programs to be the vehicle for managing extramural research projects that are selected on a peer-reviewed competitive basis and would enhance research opportunities. Science workshops among Sea Grant and the NOAA laboratories should also be held to discuss ongoing and future research findings and collaboration.
-
- **Recommendation:** NSGO must be more aggressive in:
 - a) promoting the contributions of Sea Grant to all levels of NOAA. One way to do this is to engage a larger number of NOAA's managers and scientists in the proposal review process for research and extension; and
 - b) demonstrating that America's universities are an unequalled science, technology and human resource that, through Sea Grant, can be applied to NOAA's mission.

B. Guidelines for the Future Fraction of Funding Devoted to Research

Charge #4

Is the continuation of the percentage guidelines for funding devoted to research still warranted? If so, should the percentage directed toward research vary between large or small Programs? What is the appropriate balance between research and outreach?

Research remains the foundation of the Sea Grant program upon which the outreach and education programs exist. This is true both at the national level and at the level of individual programs. The idea of a percentage goal for the amount of research relative to other components of a Sea Grant program has been generally accepted as a mechanism to provide balance to diverse program elements. Historically it has been ~50%. However, the ability to reach 50% has been hampered by the shrinking value of the dollars received by individual programs and the addition of extension program mandates (e.g., fisheries extension and coastal community development), and it has become more difficult to meet this percentage in recent years. Thus the idea of a flexible goal for the amount of research, within limits or over a range, is preferred over rigid limits. Other components of Sea Grant programs have often been eliminated or reduced in order to attempt to reach this approximate 50% research goal. A number of programs have been able to leverage external funds, state funds, and private funds to help offset the administrative costs of the program, thus helping to solve this problem. Ideally a program should develop a research effort that makes the most impact relative to the national goals of Sea Grant as well as issues that are important locally.

Under current funding, states with a smaller overall budget often find it very difficult to reach the 50% level, and this “required” percentage hampers their flexibility to develop all parts of a program. Several small programs have found it very difficult or impossible to even approach the 50% research level, or in some cases, have a viable research program at all. In some cases it may be desirable for the research programs of smaller programs to work closely or even merge with research efforts of larger programs.

Starting from the context of the National Strategic Plan, individual programs should identify priority resource management issues in their locale, what issues are not being adequately addressed, what resources (personnel, funds, skills) are needed to address an issue, what resources are on hand (program, leveraged and partnerships), and the likelihood that an investment by the program will yield a useful result. This applies to outreach and education as well as research. Such an approach should lead to the optimum research/outreach-funding ratio for that program. Thus it is probably not appropriate to indicate a preferred balance between research and outreach - this will depend to a large extent on a given program’s goals and available funding.

- **Recommendation:** The percentage of a particular program’s funding devoted to research should be flexible, although a target of 50% is appropriate for most programs. However, the particular goals of an individual program must be considered. Given this flexibility, there must be realistic, tractable and understandable metrics for research performance.
- **Recommendation:** Because some programs are too small to be able to designate a significant fraction of their funding to research, consideration should be given to combining the research activities of these smaller programs with neighboring or related programs so that all state programs can realize the research benefit.

C. Evaluation of Research in the Future

Charge #5

On what basis should research performance within the Sea Grant Program be evaluated and measured in the future? Should state and other research support for individual Sea Grant Programs be considered when evaluating the overall research effort?

Traditionally the most common metrics that have been utilized for assessing research performance are peer-reviewed publications, presentations, degrees granted, and the number, type and placement of students supported, patents, and patent royalties. Landmark papers, citations in peer-reviewed journals, initiation of new research fields or topics, sessions organized at meetings, the ability to leverage Sea Grant funds for larger grants, and partnering with other organizations to fund research have all been utilized and are certainly important in academia as a measure of the fundamental quality of the research.

However, the committee believes that in the future the assessment of the impacts of Sea Grant research will be particularly important, and at least to the same degree as traditional academic metrics. For example, the incubation of new industries and start-up businesses as a result of research and technological hurdles cleared via research are additional valuable measures of research productivity. The contribution of the Sea Grant research to the sustainable development of coastal and marine resources, addressing socio-economic issues affecting productivity or the health of coastal ecosystems, and the impact on policy and lawmaking are all important measures of impact. Programs should work continuously to encourage interactions between their outreach and research programs and devote resources to enhancing interactions where appropriate. This process requires that program management continue to interact with researchers even after project funding terminates because results are often not fully analyzed and exploited within a funding cycle. This requires effort and attention that should be recognized in the review process.

An appropriate strategy used by most Sea Grant programs is to seek alternative sources of funding to grow the research efforts. A high level of state, local and private support for research indicates that there is collaboration and that the stakeholders value what Sea Grant is doing as highly relevant and worth investing in with their money, resources, and time. While all of the funds a program marshals for research should be counted, differences need to be considered. Opportunities vary around the network, and success in this regard is not always based upon the performance of the Sea Grant program. For example, some states provide very limited support for academic research, so it is difficult for some programs to draw on extensive state assets. Under the present economic conditions, individual state investment will likely decline in many places in the near future.

The evaluation system itself can become a problem if not handled carefully and thoughtfully. The administrative burden of dealing with rising reporting requirements, data systems that are continuing to be developed, and a myriad of goals, objectives, outputs, outcomes, strategies, and performance measures at both state and national levels can lead to a significant time burden for programs.

- **Recommendation:** Assessing the impact of Sea Grant research, e.g., contributions to sustainability, improving regulatory policies, changing behavior, creating industries, etc. should have a high priority in future evaluation of Sea Grant research. In addition, the human resources, together with all publications and other research products deriving from funds administered by the Sea Grant Program, regardless of whether or not some of the funding came from sources other than Sea Grant core funding, should be considered in this evaluation. The contribution of core Sea Grant funding relative to other sources should also be monitored and reported.

D. Expanding the Research Portfolio

Charge #6

Can the decline in research funding be reversed? If so, how? What pathways can be explored to expand a Program's research portfolio?

The first charge point is addressed in Chapter III of this report. Leveraging and partnering are two approaches to enhancing current research programs that are common throughout the Sea Grant network, and these bring considerable outside resources to the Sea Grant mission. Increased partnerships with NOAA units have been discussed in Section IVA above. It is acknowledged, however, that there are positives and negatives associated with such success in acquiring extramural research funds. These additional funds indicate in real terms the good reputation that Sea Grant programs have, and they help to ensure that programs are focused on issues that are important to the local and national constituency. However, in some cases local programs may be driven by agendas that may not always be fully compatible with local and national needs and goals.

Strengthening regional partnerships and approaches to collaborative research should be encouraged and could lead to significant new funding and results. Regional partnerships can address issues that are larger and more complex than those in a single state, and national issues can often be more easily approached on a regional scale. Regional partnerships can provide excellent opportunities for involvement with other NOAA entities as well as other federal and state agencies, and this would follow NOAA's intent for regionalization in its overall programs.

Enhanced partnerships within a state that address issues of concern to that state are also excellent ways to increase support for research, and essentially all Sea Grant programs are doing this already. Many programs have close relationships with a range of state agencies involved with environmental protection in general and marine efforts in particular, as well as with the private sector and foundations. Developing close relationships with state legislatures and the various committees responsible for marine issues is also a valuable approach taken by many programs, and should be encouraged. Aligning research programs with areas whose importance is clearly going to grow in importance in the future is a sensible approach. Examples include climate-related research focused on regional issues (for example, sea level rise may be important for one region, while the effects of climate change on hurricanes may be more important for another), marine transportation issues, and energy sources in the marine environment.

- **Recommendation:** Regional partnerships among Sea Grant programs and other entities are an appropriate approach for producing significant new results that address important regional and national issues. Increased partnerships within a state with governmental and private sources are also strongly encouraged.

- **Recommendation:** Research programs should be aligned to address critical issues that will arise in the future.

Efficiency of program management is being promoted through the continuing development of databases for storing and managing data, reports, publications, etc., as well as for managing, evaluating and selecting proposals for funding. This must be directed to ensure a unified output of network accomplishments and impacts. A standardized data input format in a widely available web-based database is now practical, obviating the need for each program to independently develop and implement such a scheme. A network-wide synthesis of the results and impacts of Sea Grant research would be particularly useful, and this should ultimately be developed utilizing NIMS. NIMS has led to increased time spent on reporting by the programs, with problems about accuracy of the system and the usefulness of the reports that it generates. However, NIMS is slowly overcoming these shortcomings and in the long run will be a very useful system. Ideally, reports should only be required once, e.g., not both NIMS and Grants Online.

Many Sea Grant programs believe that their administrative burdens have been increased by more research reporting and other requirements from both the NSGO and their university. Much of the concern has been focused on NIMS, as mentioned above. Examples of the concerns expressed include incompatibility of NIMS and Grants Online, an estimate in some programs that NIMS has resulted in some people spending up to three times as much time on annual reporting as before NIMS, and the fact that NIMS is PC-centric, which is not easy for Mac users. However, as mentioned above, there was widespread feeling that eventually the problems with NIMS will be overcome and it will be very useful. There is general appreciation of the efforts being made by NSGO staff to solve these problems.

- **Recommendation:** Every effort should be made to minimize and reduce duplicative and unnecessary research reporting requirements.

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Appendix A

Questionnaire for Sea Grant Directors

Questions related to decline in research support:

- **The percentage of Sea Grant funds that is devoted to research over the entire Sea Grant Program has decreased during the past 6 or more years. What do you believe has been the reason for this decline?**
- **What are the implications of this decline to Sea Grant as a whole?**
- **If this percentage has decreased in your own program, how much has it decreased and why?**
- **If this decrease has occurred for your program, what are the long-term implications of this to your program's research and overall effort?**
- **Has reduced buying power reduced the productivity of your research program? In what ways?**

Questions related to research performance:

- **In view of the oversight demands of OMB and Congress, on what basis should research performance within the Sea Grant Program be evaluated and measured in the future?**
- **Should the training and education of graduate students and post-doctorals be a metric for evaluating research productivity?**
- **Should state and other research support for individual Sea Grant Programs be considered when evaluating the overall research effort?**
- **Are the papers recorded in the Sea Grant Library (Depository) a good measure of your program's publication activity?**

Questions related to research guidelines:

- **Historically, there has been a percentage guideline for funds devoted to research as compared to extension and education. Has this percentage impacted your program and if so, in what way?**
- **Do you believe that these percentage guidelines for the proportion of federal funds devoted to research are useful within an individual program and across the entire Sea Grant Program? If not, what would you suggest?**
- **If percentage guidelines were to continue, do you believe that the percentage should be the same for all Sea Grant Programs? Why?**

- **If percentage guidelines did not continue, what kind of criteria should be used to determine appropriate funding proportions for research for a particular program or for programs in general?**

Questions related to research program management:

- **Working under the current budget restrictions, and assuming no additional funding, what new pathways should be explored to expand a program's research portfolio?**
- **Is one of these new pathways to increase the efficiency of research program management, and if so, in what way can this be done?**
- **How have your administrative burdens been increased by research reporting and other requirements from the NSGO or your university?**
- **How can programs maximize the engagement of the best university scientists?**

Questions related to interactions with NOAA:

- **In what way should the Sea Grant research portfolio complement and be distinguished from NOAA's portfolio and with the portfolios of other coastal and marine funding agencies?**
- **Can Sea Grant engage NOAA with real collaborative synergy, as has been achieved with academic institutions in NOAA Joint Institutes? If so, how could this be done?**

Questions related to the National Office:

- **Is there a role for the National Office in promoting and enhancing Sea Grant research? If so, what should it be?**
- **Is there any other role that the National Office should be playing in this area that they are currently not playing? If so, what?**

Appendix B

Questionnaire for NOAA Laboratory Directors

Impression of Sea Grant and Its Research

- In Sea Grant, are you most familiar with its: research; extension; or educational effort?
- Have you, or your organization, worked closely with Sea Grant in the past, or are currently doing so; if yes, is your most successful collaboration in research, extension, or education?
- Do you envision additional collaboration with Sea Grant; if so in research, extension, or education?
- Is Sea Grant successful in furthering the goals and objectives of NOAA; if yes, can you provide specific examples?
- Do you view Sea Grant as being helpful in meeting the objectives of your organization; if so, how?
- Have you found Sea Grant supported research projects to be a source of trained personnel in your organization? For example, have Sea Grant-supported graduate students gone on to careers in your organization?
- Do you see merit in future disciplined-focused workshops between NOAA and Sea Grant investigators?
- Do you have any recommendations for ways that Sea Grant can further enhance your organization?
- How would you best describe Sea Grant?
 - A partner
 - No impact on my organization
 - Competitor for limited funding dollars

Appendix C

Questions for Interviewees and their Names

Questions Asked

What is your assessment of Sea Grant's role in promoting the betterment and dealing with the problems and opportunities of our coastal environment?

What is your assessment of Sea Grant's effectiveness in meeting this role?

Is the integration of research, education, and engagement (i.e., outreach) in Sea Grant viewed as a national strength?

- If so, is this integration being utilized by Sea Grant to the nation's advantage, and if not, how would you see this being approached differently?
- Does this integration provide Sea Grant a critical niche among coastal programs?

Sea Grant's funding has been declining in constant dollars for the past several years. Are there fundamental changes that Sea Grant should make to reverse this decline in funding?

- If so, what are these changes?

Names of Interviewees

David Evans, Former NOAA Assistant Administrator for Oceanic and Atmospheric Research

Mary Glacken, Deputy Under Secretary for NOAA Oceans and Atmosphere

Louisa Koch, Director, NOAA Office of Education, Former OMB Examiner

Margaret Leinen, Former Assistant Director for Geosciences, NSF

Stuart Levenbach, OMB Examiner

Gene Lockwood-Shabat, DOC Budget Office

Heidi Keller, DOC Budget Office

John Rayfield, House Transportation Comm.; previous House Comm. on Natural Resources

Bonnie Bruce, House Committee on Natural Resources

Rick Spinrad, NOAA Assistant Administrator for Oceanic and Atmospheric Research

Dan Walker, Office of Science and Technology Policy, Former NRC Ocean Studies Board staff

Emily Woglom, Former OMB Examiner, currently at The Nature Conservancy

Eric Webster, Former House Science Comm.; former Director NOAA Congressional Affairs, currently at ITT

Appendix D

Summary of Responses from Sea Grant Directors

Questions Related to the Decline in Research Support

- **The percentage of Sea Grant funds that is devoted to research over the entire Sea Grant Program has decreased during the past 6 or more years. What do you believe has been the reason for this decline?**

Only two programs disagreed with our assertion. One program argued that the apparent decline in their program (not necessarily Sea Grant as a whole) was an artifact of “add ons” and pass throughs for outreach. The other program said the percentage was constant but inflation had decreased the amount of research that could be done. Virtually all of the other 26 program responses agreed that the decline was real and due to essentially flat federal funding and rising costs of salaries, fringe rates, indirect costs, graduate student stipends, tuition, travel, and supplies. It was noted that the decline of NSIs also contributed to declines in research. Programs value experienced staff and want to retain (and properly reward) them. It is not easy or desirable to replace them with less expensive and inexperienced people. In some cases programs had protected research to some extent by moving staff to state funds. The only “easy cut” is to reduce research.

- **What are the implications of this decline to Sea Grant as a whole?**

With the exception of one director who wrote, “Actually, I am not too concerned about it, as long as Sea Grant continues to do some excellent, innovative, and useful research,” all of the other programs felt that this was a grave threat to the future credibility of Sea Grant. As one person said, the decline was “taking the grant out of Sea Grant.” Programs in general are struggling between the number of projects they can fund v the size of projects they can fund – a difficult situation. As one reply noted, they can request very few full proposals from the pre proposal process or encourage a larger number and end up with an acceptance rate far lower than NSF for projects with much less money than NSF. Almost all programs reported that they have been reducing the number of projects funded through core funding and some are capping the size of grants. The latter varies a good deal – the five programs that mentioned a cap ranged from \$80K to \$110K/year. One program noted that their typical grant of \$60 to \$80K would support one student and some supplies or a PI’s summer salary and supplies, but not both. Many programs felt that Sea Grant was losing credibility as a funding source for coastal research, and that it was losing its ability to attract the best PIs because of high “transaction costs” and the small size of grants. Several programs felt that there would be a trend to fund only beginning scientists who were less expensive (no one was opposed to funding beginners, but most felt that it was important to have a mix of high profile seniors and promising beginners). There may be pressures to fund less expensive social science and demonstration projects rather than more expensive physical and natural science research. One program made the important point that low project budgets “also implies that complicated, integrated and interdisciplinary science on today’s critical issues...will be extremely challenging to fund.” Another program noted pressure to fund fewer risky basic research and instead fund more targeted, stakeholder driven “downstream” topics.

- **If this percentage has decreased in your own program, how much has it decreased and why?**

It is a bit challenging to summarize the replies to this question because some programs did not respond directly (of these three programs, one noted there were too many ways to make the calculation), and

others used different time periods for comparison. It is also confusing because “program” was considered differently – some as the core omnibus Sea Grant Program and others as all the funding they manage, including state, special projects, etc. As best we can tell, 8 programs reported declines in percentage devoted to research ranging from 4% to 30% (the latter for a small program). Surprisingly 14 programs seemed to feel that their research had not declined – but it is possible that in most (if not all) of these cases they were including increases in state and other sources of “leveraged” support in their assessment.

- **If this decrease has occurred for your program, what are the long-term implications of this to your program’s research and overall effort?**

Interestingly, even some of the programs not reporting a decrease in research responded to this (probably reflecting the mixture of interpretations of “program”). In general the implications for individual programs were the same as those for Sea Grant as a whole – loss of credibility as a serious funding source, decline in student support, major reductions in the number of projects funded, lack of ability to respond to stakeholders, loss of innovative capacity, inability to attract senior PIs, etc. There were concerns that Sea Grant would become viewed only as an outreach program. For small programs the decline in ability to fund research is particularly acute. For example, one program funded 7 projects in the 06-08 omnibus; 4 in 08-10 and projects 2 in 10-12 and 1 in 12-14. Total research for the next two years for that program is budgeted at \$100K.

- **Has reduced buying power reduced the productivity of your research program? In what ways?**

We received an interesting mix of responses. While virtually everyone agrees that their buying power has gone down, no one seems eager to say that their productivity is going down. On the other hand, there is a mass balance problem, at least within the constraint of the core omnibus Sea Grant program. Several programs report that they have been able to “buffer” their Sea Grant research against cuts and inflation by reallocating state funds or acquiring more state funds. Most recognize that this is “not sustainable” if the core funds continue to stay flat or decline further. A number of directors are rightly proud of their ability to “leverage” funds from other federal and state sources. It seems that the word “leverage” has become the mantra of Sea Grant directors. There are some obvious dangers here. The first is that the current budget crisis in many coastal states will have a sharp and immediate impact on programs that have come to rely heavily on the “leveraging” of state resources. The more subtle problem is that Sea Grant will come to “own” less and less of what “it” funds. At what point does the local Sea Grant office become a “job shop”? At what point does a Program become a pipe through which other monies flow? We believe that these questions deserve some serious thought. Obviously, directors try to capture and manage funds that seem consistent with Sea Grant strategic plans and goals, but there is some danger that success as “leveragers” is making some complacent about what is happening to the Sea Grant Program and concept.

Questions Related to Research Performance

- **In view of the oversight demands of OMB and Congress, on what basis should research performance within the Sea Grant Program be evaluated and measured in the future?**

The most common metrics utilized for research performance are publications, presentations, degrees granted, number and type of students supported, patents, and patent royalties. Some responders pointed out the value of landmark papers, initiation of new research fields or topics, and sessions organized at meetings. (Small programs stressed that the number of publications should be measured relative to the

size of the Sea Grant program.) Efforts to synthesize information should also be viewed as valuable and providing impact. Citations in peer-reviewed journals should also be considered.

It was pointed out that the ability to leverage Sea Grant funds for larger grants should be an important measure that should be included in research productivity. Given the relatively small amount of Sea Grant funds, partnering with other organizations to fund research should be viewed very positively. Programs should be credited for leveraged funds, faculty, staff, and students trained by Sea Grant who now work in NOAA and other government agencies. New industries incubated via research, and technological hurdles cleared via research are valuable measures of research productivity. Research that results in startup businesses and application of research that results in changing behavior are issues that should be considered.

The impact of the research as measured by performance measures in the National Sea Grant Implementation Plan should be included. There are metrics being developed to measure the real impacts that Sea Grant research has on citizens' economic status, health, and quality of life. The contribution of the Sea Grant research to the sustainable development of coastal and marine resources; problem solving; tackling socio-economic issues affecting productivity or the health of coastal ecosystems; and the impact on policy making are important measures of productivity.

It was noted that it might take years as well as additional, subsequent funding to fully develop many of the best measurement tools. Assessment should be retrospective, over a long-term (five to ten years), asking program stakeholders/agencies to discuss the value of the program's research *in toto* to their own activities. It could be that the end product could not have happened without Sea Grant funding, but because it happened after the Sea Grant project ended, the agency that provided the later funds receives credit. Integration of the research with the outreach parts of the program should be encouraged by the evaluation system.

One of the biggest problems mentioned by responders is the evaluation system – the administrative burden of dealing with rising reporting requirements, data systems that don't work and a myriad of goals, objectives, outputs, outcomes, strategies, and performance measures at state and national levels. They emphasize that many of these systems are not well designed to measure research performance, particularly projects with longer-term payoffs.

- **Should the training and education of graduate students and post-docs be a metric for evaluating research productivity?**

There was a unanimous "yes" from responders. All agree that student performance and their placement in the workforce should be used to assess impact from Sea Grant's research enterprise. They point out that funding future researchers and scientific leaders is one of the most important things we can do for the future protection of aquatic resources. They note that students funded by Sea Grant will become the leaders of tomorrow who may have influence over Sea Grant's future. Without the cadre of scientists that come through Sea Grant and other government-supported programs, we as a nation will suffer greatly. Overall, they point out that our best investments are in graduate students and scientists at the beginning of their careers. The NMFS-Sea Grant fellowships are currently listed in NIMS as Education (E/) projects. These funds support research and should be counted as such. Graduate students and post-doctoral students should be evaluated for their research productivity and their outreach activities.

- **Should state and other research support for individual Sea Grant Programs be considered when evaluating the overall research effort?**

Responders say that it is generally an appropriate strategy to seek alternative sources of funding to grow the research efforts. When there is a high level of state, local and private support for research it indicates that there is collaboration and that the stakeholders view what Sea Grant is doing as highly relevant – efforts that are worth investing in with their money, resources, and time.

Responders pointed out that Sea Grant extension agents and specialists have a considerable amount of research supported by state agencies and various federal agencies in addition to the core.

It was pointed out that if we include all research projects irrespective of source of support, some of the projects evaluated and measured would not mesh well with federal priorities. They suggest that the entire Sea Grant budget (core and match) should be considered, but only if the non-Sea Grant supported components are truly integrated in the overall program.

While responders agree that all of the funds a program marshals for research should be counted, they also expressed that program differences need to be considered. Such opportunities vary around the network, and success in this regard is not always based upon the performance of the Sea Grant program. They point out that some states provide very limited support for academic research, so it is difficult for some programs to draw on extensive state assets.

- **Are the papers recorded in the Sea Grant Library (Depository) a good measure of your program's publication activity?**

Programs emphasize that for the most part the publications are recorded in the Sea Grant Library. However, this is not a complete list because at times PIs publish and do not let the Sea Grant Program know about the publications until well after the fact, if at all. There is often a long time lag before the papers get to the Sea Grant Library. Directors point out that today there are many electronic-only publication items that cannot physically be sent to the library. It would be ideal to have the Sea Grant library upload them, but that will take the help of programs throughout the network.

The library is one measure but certainly should not be the only measure. Respondents point out that for research evaluation purposes it would be much more effective to report research publications for each project in NIMS. They mention that currently research publications are collected as a compiled publications table – this does not contribute to the evaluation of individual projects, nor does it provide details on the caliber of peer-reviewed publications (i.e., high impact journals) or presentations (e.g., invited or plenary conference presentations).

Questions Related to Research Guidelines

- **Historically, there has been a percentage guideline for funds devoted to research as compared to extension and education. Has this percentage impacted your program and if so, in what way?**

The idea of a percentage goal for the amount of research versus other components of a Sea Grant program is generally accepted as a mechanism to level the efforts of the diverse programs. The generally accepted value as viewed historically is 50%. Other memory of percentage of research to strive for was somewhere between 45 to 65%, another 40 to 60%. Another program believed that the range was 30 to 50%, with flexibility. Several programs indicate that this (close to 50%) is a desirable goal, but also indicate that the ability to reach 50% is hampered by the shrinking value of the dollars received by individual programs. It is becoming harder to meet this percentage.

Other aspects of Sea Grant programs have been eliminated in order to reach an approximate 50% research goal. To adequately reach this goal supplemental funds are needed to meet it. Some Sea Grant programs feel penalized because they do not or are not able to attain this percentage. For those states with a smaller overall budget, it is difficult to reach the 50% research level. In the case of these programs, the 'required' percentage hampers flexibility of a program to develop all parts of the program. This level of ~50% research support in a Sea Grant program is more likely to be accepted by the larger programs.

The need to incur some fixed costs to run and maintain a Sea Grant program prevents meeting the 50% research goal. However, the more successful Sea Grant programs are leveraging external funds, state funds, and private funds to help offset the administrative costs of the program. In other programs research projects integrated with other funding agencies has provided a mechanism to maintain the research percentage.

The goal to reach a 50% support of research within a program has hampered the establishment of important outreach programs, especially where Sea Grant program advisory boards have recommended that a certain amount of the program, e.g., outreach, should meet a percentage of funding at 33%.

- **Do you believe that these percentage guidelines for the proportion of federal funds devoted to research are useful within an individual program and across the entire Sea Grant Program? If not, what would you suggest?**

The idea of establishing a goal of a percentage of funding to be directed to the research component of a Sea Grant program is generally accepted, because it provides a uniform guideline for all programs under the National Sea Grant Program. The idea of a flexible goal for the amount of research, within limits or over a range, is preferred over rigid limits. Because of the diverse sources of funding for each Sea Grant program, it is difficult to determine exactly what percentage of funds is devoted to research versus other funds in the overall program.

The smaller Sea Grant programs were not as enamored with a percentage to be directed to research, particularly at the approximately 50% level.

If the decreasing support of Sea Grant (in real dollars, or worse) continues, then a smaller percentage can be directed to research. However, if this continues for the long-term, the research reputation of the Sea Grant Program would be diminished considerably. One program suggested that there be a division of research funds between 5-10% devoted to 'regional' research plus 30-40% for state programs.

Several dissenting opinions were that there should be no guidelines for a percentage of research funds in a program. A program, within the limits of the omnibus, should be allowed to develop a research effort that makes the most impacts relative to the important issues of the state and its stakeholders. Longer-term programs are more fully invested in the generation of new knowledge (i.e., research) and now need to develop a portfolio to synthesize this knowledge into a product that will more strongly connect to their local, state and regional situations. One percentage does not fit all.

- **If percentage guidelines were to continue, do you believe that the percentage should be the same for all Sea Grant Programs? Why?**

Most programs indicate that a uniform guideline for consistency among the programs, with some flexibility, would be best. Flexibility is continually identified as a mechanism for determining a percentage of funding to go to research programs, versus education, outreach, and administration. A range is more helpful than rigid percentage guidelines. Again, those states with smaller programs are

more reluctant to be guided by a 'one size fits all,' but that there should be an adjustment for the smaller-sized programs.

- **If percentage guidelines did not continue, what kind of criteria should be used to determine appropriate funding proportions for research for a particular program or for programs in general?**

The opinions of several respondents indicate that the metrics of ranges of funding to research, education, outreach, and administration cannot be uniformly applied to the range of Sea Grant programs. If there is to be a percentage, it should be based on the total funds over and above the base level of funding.

Individual programs should identify priority resource management issues in their area, what issues are not being adequately addressed, what resources (personnel, funds, skills) are needed to address an issue, what resources are on hand (program, leveraged and partnerships), and the likelihood that an investment by the program will yield a useful result. This applies to outreach, education and research. Applying these criteria will allow programs to develop models for component outputs, outcomes and impacts. As a gross measure, cost-benefit estimates can be used to guide resource allocation and promote efficiency of resource use.

There are significantly different regional needs across the nation. In some regions the scientific and management needs are very similar across programs; that is, research programs respond to parallel needs in adjacent or nearby states. In those cases, economies of scale may allow a set of realistic funding proportions across two or more programs. In one coastal region, the issues and needs for research and extension differ extensively, so that regional cooperation is possible, but research questions are quite diverse and much less amenable to a cross-state context. A regional research and information needs portfolio is being developed that will allow us to work with partner Sea Grant programs where possible, on both research and extension initiatives.

One respondent suggested that an overall program portfolio that maximizes science-to-management, technology transfer/adoption, and the application of science-based information in various public decision-making situations would be the best measures of performance of any given research/extension-funding ratio. Perhaps a better determination of percentage of funds spent for research should be determined as a result of what are the impacts of the various components of a Sea Grant program. In some way, this speaks more to the education and outreach portion of a program, which is more tractable than the research component, especially with regard to usefulness to the stakeholders.

A 'pre-determined' goal for a percentage of program funds to go to research has provided a uniformity to which programs are inclined to emulate. However, such a percentage has caused problems in more recent years with the declining buying power of funds from the Sea Grant program and/or state supporting funds. With a stated goal of percentage research, albeit quite flexible, there is less flexibility in a program to develop other aspects of their programs, i.e., education and outreach. Also, fixed costs of a program (mostly administrative) often dictate what level of funding is available for research, outreach and education.

That a proportion of program funds go towards research is generally accepted, as long as the range is broad and flexible. The larger programs are more inclined to accept a higher percentage of research funding as a goal and an across-the-board application than smaller programs.

Alternative schemes to using a percentage for research funding are to leave the determination of spending of Sea Grant program funds to the individual programs as they address the needs of their

program, primarily as a result of local needs and stakeholder input. What is not clear is the way in which the 'success' of a Sea Grant program can be evaluated with regard to research, outreach, and education to be measured

Questions Related to Research Program Management

- **Working under the current budget restrictions, and assuming no additional funding, what new pathways should be explored to expand a program's research portfolio?**

Leveraging and partnering represented by far the most common suggestion from Directors in this area. This practice is already common throughout the network and brings considerable outside resources to the Sea Grant mission. Success in this is viewed to reflect the good opinion with which Sea Grant programs are held by local constituents, agencies and university administrators. It is acknowledged that there are positives and negatives associated with success in acquiring research funds extramural to those provided through the NOAA budget. On the one hand, these additional funds indicate in real terms the value with which Sea Grant programs are held and they help to ensure that programs are focused on issues that are important to the local constituency. On the other hand and despite the fact that the foundation for Sea Grant programs derives from their core NOAA funding and their connection to NOAA's mission, local programs may be driven by agendas that may or may not be fully consonant with the parent organization. Overall, however, Sea Grant was envisioned from its inception as a partnering institution and the matching requirement ensures the continuation of the principle both for research and outreach.

There was strong support for strengthening regional partnerships and approaches to collaborative research. Regional partnerships among Sea Grant programs, including pooling of resources from several states and developing joint research efforts with aligned RFPs, could lead to significant new funding and results. Such regional partnerships would be able to address issues that are larger and more complex than those in a single state. Funds could be set aside to address national issues that could be approached on a regional scale. As pointed out by several programs, however, there are some problems with expanding this approach too much. Different programs would contribute different amounts of funding for such efforts, there would be increased fiscal management requirements and complications, and the efficiency of overall project management could be degraded. These issues could likely be overcome, but the effort to do so would likely be significant. Such regional partnerships need not be restricted to state Sea Grant programs alone. There would likely be excellent opportunities for involvement of other NOAA entities as well as other federal and state agencies. Involvement of other federal agencies in particular might be very positive, since in many cases these agencies are responsible or concerned about issues that cross state boundaries. One possibility for increased funding might be to become more involved with monitoring activities, as such measurements are being increasingly recognized as of critical importance, and a variety of state and federal agencies are concerned with such measurements.

Of course enhanced partnerships **within** a state addressing issues of concern to that state are also excellent ways to enhance support for research, and essentially all Sea Grant programs are doing this already. Many programs have close relationships with a range of state agencies involved with environmental protection in general and marine efforts in particular. Developing close relationships with state legislatures and the various committees responsible for marine issues is also a valuable approach taken by many programs, and should be encouraged. Working with the private sector and foundations can also generate new funding, but again, most programs are doing this already.

Several programs have pointed out that a good strategy is to align their research programs with areas whose importance is clearly going to grow in importance in their state in the future. While this can certainly vary from state to state, there are a number of such areas that can be identified that are likely regional or even national in character. These include climate-related research focused on a particular state's issues (for example, sea level rise may be important for one state while increased hurricane strength may be more important for another), marine transportation issues, alternative energy sources in the marine environment, and human dimensions research. Evaluating the expected areas of critical importance for a state program would be addressed in the development of that program's strategic plan, and many state programs are doing this already.

There is also some support for minimizing NSIs in the future and placing those funds back in the core funding for programs. While this would increase research funding for a particular program or programs, it does not enhance research funding for Sea Grant as a whole.

Finally, there are some administrative-type changes that could help to increase the amount of funding (or the percentage of total funding) that is devoted to research within a program. Examples include restricting and capping the level of indirect costs at a particular institution, including having no overhead on the first \$25K of sub-contracts as is currently the practice of USDA with partnering universities and colleges; streamlining the administrative requirements for NIMS and other reporting structures; capping project award amounts; and categorizing expenses for graduate students and mini-grants as research.

A variety of other suggestions were offered. These included: instituting a minimum level of funding for programs; linking investigators for other funding sources; forging partnerships with other NOAA units that would allow Sea Grant programs to be the vehicle for funding extramural research that is selected on a peer-refereed competitive basis.

- **Is one of these new pathways to increase the efficiency of research program management, and if so, in what way can this be done?**

While many respondents felt that their programs were being managed as efficiently as possible, other responses to this question varied, such that this question led to a very mixed response from the Sea Grant programs. Table 1 provides a summary of the responses to this question.

Table 1

Responses to the Question "Can the Efficiency of Research Management Be Increased?"

Yes	No	Uncertain	No response
9	12	5	6

Of the 32 state Sea Grant programs, six did not respond to this question and 5 were uncertain as to whether the efficiency could be improved over what is presently being done. Nine programs believed that efficiency could be improved and 12 did not. Of those that did believe there could be improved efficiency, several believed that the improvement would be minor. The majority clearly felt that programs were already operating as efficiently as possible. Again, improved efficiency, while always to be strived for, would not increase the overall amount of funding, but would simply allow more of the present funding to be utilized for research and other activities of the programs - a worthy goal, of course.

There were some suggestions as to how efficiency in some areas could be improved. There was broad and generally strong support for continuing efforts to build databases for storing and managing data,

reports, publications, etc., as well as for managing, evaluating and selecting proposals for funding. It was suggested that this must be directed to ensure a unified output of network accomplishments and impacts. At the present time different programs use a variety of database programs to record this information. A standardized data input format in a widely available web-based database would now be practical, obviating the need for each program to independently develop and implement such a scheme. This database would also be useful for the NSGO and the SGA. In general, a network wide synthesis of the results and impacts of Sea Grant research would be particularly useful, with hope that this could ultimately be developed utilizing NIMS. One respondent suggested that host universities fund administrative positions, at least in part. This would reduce that cost of management for the federal grant.

The area where most concern was expressed was with NIMS in particular and the reporting structure in general. There was widespread concern that NIMS had led to greatly increased time spent on reporting, with problems with accuracy of the system and the usefulness of the reports that it generates, although there was also acknowledgment that NIMS is slowly overcoming these shortcomings and in the long run will likely be a very useful system. There was also concern that reports should only be required once, e.g., not both NIMS and Grants Online.

As mentioned in the section above, regional and collaborative programs can also help to reduce many administrative activities. Examples include the pooling of resources for joint RFPs with state agencies and regional research programs, and the reduction or deferral of infrastructure costs. Other administrative changes could also lead to improved efficiency, including biennial calls for proposals, web-based RFP and pre-proposal submissions, and in general tailoring research management to the level of work at hand.

- **Have your administrative burdens been increased by research reporting and other requirements from the NSGO or your university?**

Although responses to this question were longer and more detailed than those to any other, they can be more easily summarized. The answer is, “Yes!” While most have noted that the switch to NIMS is the most important factor, many are hopeful that administrative burdens will decrease once NIMS is fully realized and perfected. Several respondents acknowledged that administration and reporting are part of the job and are essential to ensuring quality. Table 2 provides a summary of the responses to this question.

Table 2

Responses to the Question “Have your Administrative Burdens Been Increased by Research Reporting and other Requirements from the NSGO or your University?”

Yes	No	Uncertain	No response
20	4	3	5

Of the 32 state Sea Grant programs, five did not respond to this question and 3 were uncertain as to whether administrative burdens have been increased. However, of those who did give a yes or no response, 20, or 83%, believed that their administrative burden had been increased, while only four believed that it had not. It is clear that there was a strong feeling that the administrative burdens for Sea Grant programs have increased significantly in recent years. Some sample quotes include:

“I’d guess the administrative burden has increased by about 0.5 FTE in the past five years.”

“Administrative requirements are a voracious and mad monster and all of us are the victims.”

“The new reporting requirements have significantly increased our administrative effort requirements.”

“Research reporting has become exceptionally burdensome of late.”

“Oversight and reporting requirements have become extremely burdensome in the past five years or so.”

“NIMS and other electronic data submission systems that have been imposed without adequate testing have been an ENORMOUS time sink for our staff.” Others had similar feelings.

“More time is devoted to reporting outcomes and less effort devoted to making things happen.”

“The reporting system is less user friendly than ever. Cycles for reporting do not match, and there have been constantly changing demands.”

Much of the concern has been focused on NIMS, as mentioned above. Examples of the concerns expressed include incompatibility of NIMS and Grants Online, an estimate that NIMS has resulted in people spending 3 times as much time on annual reporting as before NIMS, and the fact that NIMS is PC-centric, which is not easy for Mac users. However, as mentioned above, there was widespread feeling that eventually the problems with NIMS would be overcome and it would be a very useful program. Concerns were expressed that it was released before all the bugs had been worked out, but there was in general complimentary statements about the efforts being made by NSGO staff to solve these problems.

- **How can programs maximize the engagement of the best university scientists?**

The obvious suggestion that was made by most Sea Grant programs was to provide more funding so the success rate would be higher - that would clearly help to bring in the very best scientists. Related to this would be increasing the size and number of individual grants. However, with increased regular funding an unlikely possibility soon, other means of bringing the best scientists into the Sea Grant program must be found.

Among a variety of thoughts, the following were most common from the respondents. Run fair, open, peer-refereed competitions that provide investigators with a realistic expectation of funding and with sufficient funds to accomplish something meaningful. Directors should actively recruit the best talent. “We should also have a nice mix of young, mid-career and established scientists. Nurturing new talent is obviously beneficial in the long run. Mid-career level scientists bring a lot of good energy and opportunities for multi-agency efforts. That is, these scientists often have large research efforts from NSF, EPA, etc. The same goes for the established scientists, plus there is a sense of loyalty that is very effective for our outreach efforts.” Mini/program development grants can also provide the means for attracting new investigators. Also expressed was the opinion that it is good to engage young investigators and mix these with mid-career, established investigators. The worry was that low levels of funding, combined with the long duration of the application process (time of pre-proposal to the time of grant award) can be deterrents for the most accomplished university scientists.

One approach (which many programs take already) would be to connect scientists more closely to non-university interest groups, such as communities, non-profit organizations, or small business groups to

identify potential research projects, and when this is done make certain that this is followed up by extending the results of those projects back to the stakeholders and partner groups. Related closely to this is having an effective and desirable extension program to offer as partners to stakeholders that adds value and credibility to the research project, the researcher and the portfolio.

Support of graduate students and their research has always been a strong point in Sea Grant. Targeting the students of “the best university scientists” instead of directly targeting the scientists themselves is an approach that would still bring in the best scientists in a more advisory capacity, but at the same time enable the best students to become familiar not only with Sea Grant but with the entire funding process and what is required to develop a good, fundable research program. This process of “training” young researchers will lead overall to a stronger cadre of scientists who in the future may well be involved with Sea Grant research and programs at other institutions.

Another possibility suggested is to initiate a Program Development account that would be set at, ~15% of the overall omnibus award (although the Grants Office thinks that even 10% is too high). This would enable a program not only to increase the engagement of university scientists, but also to be more widely viewed as a more responsive “mover and shaker” in executive agency, legislative and stakeholder circles. Several programs are doing something similar to this already.

It was suggested that there are also some administrative changes that could serve to encourage the best scientists to become involved with Sea Grant. These include:

- Cutting down administrative burdens in general.
- Offering longer-term funding commitments (i.e., > 2 years).
- Making smaller pots of money more readily available (less paperwork, etc.).
- Reducing the match requirement.
- Having reasonable reporting requirements and grants that are sufficiently large.
- Increasing the flexibility to leverage Sea Grant funds with other federal research funding sources.

Questions Related to Interactions with NOAA

- **In what way should the Sea Grant research portfolio complement and be distinguished from NOAA’s portfolio and with the portfolios of other coastal and marine funding agencies?**
- **Can Sea Grant engage NOAA with real collaborative synergy, as has been achieved with academic institutions in NOAA Joint Institutes? If so, how could this be done?**

Strength of Sea Grant

Not unexpectedly, several of the respondents took the opportunity to highlight the value and strength of Sea Grant. Of the twelve who highlighted these strengths, several mentioned the flexibility that Sea Grant offers. Not encumbered by the “stovepipe” approach of NOAA, Sea Grant is able to utilize a broad range of expertise, easily integrates research and outreach components, and responds quickly to the needs of the coastal community. Through Sea Grant and its competitive process for awarding research funding, the nation’s leading universities are better positioned to recognize and address important marine and coastal issues. The integration of extension and education with research contributes significantly to solving existing and emerging local and regional problems.

Adding value to Sea Grant is its match requirement. Unique to coastal research and outreach, this requirement confirms the value of the intended work and demonstrates to the Federal Government the commitment of the local community. It is a testament that the Sea Grant research priorities are reflective of local stakeholder needs.

Through its strategic planning process, Sea Grant research is closely aligned with NOAA's mission and goals. Thus Sea Grant brings to NOAA an integration of research, extension, and education, a strength not existing elsewhere within NOAA. Due to its close linkage with the local and regional coastal communities, Sea Grant's research is highly complementary but not duplicative of NOAA research. Sea Grant has consistently recognized the importance that its research be influenced by local stakeholder needs and the need to maintain an allegiance with these core groups of constituents.

Synergism with NOAA as positive

Only three out of the 26 respondents view the relationship with NOAA as positive without any steps needed to enhance the relationship. This small population believes this current relationship as too good and too important to change. They believe, however, that frequently Sea Grant is out ahead of NOAA in engaging stakeholders and developing strategic plans. They also feel that NOAA doesn't fully appreciate Sea Grant's proactive position.

Synergism with NOAA is positive but certain actions are needed for improvement.

Twelve respondents identified ways to improve on what they consider as a positive relationship with NOAA. They see Sea Grant as the logical vehicle for identifying research of interest to the local and regional stakeholders, but do not believe that NOAA is currently giving Sea Grant the appropriate role for engaging and implementing the user/client-oriented research. Nearly every project that Sea Grant funds can be linked in various ways to the NOAA mission. From their perspective, NOAA needs to recognize Sea Grant as a collaborator by adding value to NOAA work rather than being viewed as a competitor of NOAA's resources. They caution, however, that real collaborative synergy may not be possible until NOAA accepts stakeholder engagement in the research process and Sea Grant accepts that it is part of a mission-based agency and is not a program wholly owned and directed by the university elements. They see a general lack of NOAA engagement with universities and believe that this lack of engagement underpins the problem that needs to be addressed before Sea Grant can satisfactorily engage NOAA through integrated research.

In face of these impediments, they argue that certain steps can be taken to enhance this collaboration including sharing of facilities between Sea Grant and NOAA. Either as a complement or in lieu of sharing facilities, they recognize value in seeking joint funding opportunities with an integration of some aspects of a research program. They believe that niches exist for Sea Grant to work jointly with NOAA researchers concentrating on large-scale projects with Sea Grant focusing on research projects with local impacts, such as coastal management programs or the NMFS Sanctuary program. Other suggestions include using Sea Grant to administer various national research initiatives for the NOAA line offices, and using NOAA line managers on Sea Grant advisory committees, extension advisory committees and on research review panels. They believe that Sea Grant must be more aggressive in looking for opportunities to effectively engage the NOAA laboratories.

A significant inhibitor, in their view, is the lack of appreciation at various levels of NOAA as to the significance of Sea Grant. There is a reasonable understanding of Sea Grant at the highest level of NOAA but few Sea Grant champions are found at the field level of NOAA. They argue that the National Sea Grant Office should take a more aggressive role in highlighting how Sea Grant can help forward the mission of NOAA. Similarly, NSGO should look for niches utilizing Sea Grant strengths.

Effective packaging of the Sea Grant accomplishments and its impact on the NOAA missions should be a high priority of all levels of Sea Grant.

Little synergism exists between NOAA and Sea Grant

Ten of the programs responded with comments questioning meaningful synergism. Some of these programs did, however, offer suggestions of a positive nature and were included in the two previous sections. A common impression is that NOAA has shown little interest in utilizing Sea Grant strengths or viewing Sea Grant as a partner. Rather their perception is that Sea Grant is viewed by much of NOAA as insignificant. They use as arguments that NOAA re-creates and duplicates programs and abilities previously established and utilized by Sea Grant while offering little credit to Sea Grant.

For this to change, they believe that NOAA would have to go through a “sea-change” resulting in Sea Grant being viewed as a fully contributing partner. Similarly, others believe Sea Grant must make a very substantial change in mindset and to actively seek participation of NOAA researchers on Sea Grant projects, something that Sea Grant has been reluctant to do. Whereas the NSGO must play a role in developing meaningful synergism, collaborative efforts may have to play out initially with individual or small subsets of the overall Sea Grant network so that specific NOAA needs can be meshed with specific Sea Grant programs. The skeptics argue, however, that this has not happened on a significantly measurable level in the past 30 to 40 years, i.e., since inception of the program, and no substantive actions have been taken to change the prevailing attitudes in either NOAA or Sea Grant.

Risks to be avoided

Several of the respondents, while acknowledging the importance of close cooperation with NOAA, see some associated risks. The greatest risk is becoming too much like NOAA’s research and losing Sea Grant’s identity and purpose. These risks are accentuated when research, aligned under broad themes relevant to coastal issues, become overly prescriptive. Another fear is that Sea Grant will drift from focusing on real world problems of the coastal community. Others see the need for a continuation of exploratory research and applied solutions in an effort to engage the best scientists to bring innovative ideas for solving key issues. If Sea Grant is unable to maintain both its “complimentary role to NOAA missions” and its problem-solving, applied research orientation, then program identity and eventual funding is jeopardized. Sea Grant must continue to be a leader in working with stakeholders in addressing most relevant issues and effectively communicate the results to a wide range of end-users. It must continue to develop performance measures to document its ability to address issues as they relate to local and regional scales.

Joint institutes as a model for Sea Grant

The few respondents who addressed the Joint Institutes as a model for Sea Grant were less than generous in their assessment of the Joint Institutes. In their view the Joint Institutes have typically been used by NOAA as a vehicle of convenience rather than a meaningful partnership. The Joint Institutes have no authorization language and have little of the bureaucracy endemic to NOAA making them more responsive for shared needs. As a result, NOAA has used these organizations as earmarks for getting money to NOAA programs or to by-pass the more cumbersome NOAA administrative rules for purchases or hiring of contractors.

While not a model to be emulated by Sea Grant, the organizational flexibility of the Joint Institutes proves an attractive option to some of Sea Grant’s partnering needs. Also the Joint Institute model may be necessary to thrive in an ever-changing bureaucratic environment of NOAA and the Administration. OMB has expressed the desire to see “coastal integration of Sea Grant and other NOAA elements.

Questions Related to the National Office

- **Is there a role for the National Office in promoting and enhancing Sea Grant research? If so, what should it be?**

There was broad agreement that an important role for the NSGO is communicating the value of Sea Grant research within NOAA. To the same end, it is important that the NSGO synthesize research outputs and impacts and communicate these in a compelling way to other NOAA offices and across the network and nationally. Communicating and demonstrating the impact and success of Sea Grant research directly to other parts of NOAA was a frequent theme.

Another general line is linking Sea Grant to NOAA initiatives and vice versa, and promoting the idea of Sea Grant could serve as a vehicle for NOAA offices for managing and recruiting their extramural funding portfolio. The NSGO could help Sea Grant become much more informed about ongoing research in NOAA. The NSGO could find opportunities to jointly fund research initiatives between Sea Grant and other agencies such as NSF. Similarly, it was suggested that the NSGO might pursue partnerships with other agencies that may share mission, goals and objectives (e.g., the Smart Growth relationship with EPA).

It was suggested that NSGO personnel should be redirected from present time-consuming activities to spend more time on Sea Grant-specific tasks. One respondent opined that NSGO should look across the state programs and identify common needs across the states and note that this is not the same as identifying national needs. It was suggested that the NSGO develop pre-negotiated rates with all SG institutions that standardize and control costs on indirect cost rates, pass through funding policies, and student fee remissions.

- **Is there any other role that the National Office should be playing in this area that they are currently not playing? If so, what?**

As one Sea Grant Director stated, “The single most important issue facing Sea Grant and its research portfolio is limited funding. A common objective of the NSGO, Sea Grant Advisory Board and SGA should be to enhance our funding base to ensure that the current very low success rates of preliminary and full proposals submitted to Sea Grant increases substantially. Without more funds to spend on research we will unhappily see the impact of Sea Grant funded research continue to decline.”

Appendix E

Summary of Responses from NOAA Laboratory Directors

Thirteen NOAA laboratory Directors responded to the questionnaire. Five of these were from OAR, two from NOS, and six from NMFS. In general, the OAR and NOS Directors were less knowledgeable of Sea Grant but placed a higher value to Sea Grant than did the NMFS Directors. The NMFS Directors were either highly complementary or highly critical of Sea Grant. The Directors were asked nine questions.

- **In Sea Grant, are you most familiar with its: research; extension; or educational effort?**

With the exception of OAR's GFDL, all were familiar with Sea Grant, with Research and Extension being the areas with which they were most familiar.

- **Have you, or your organization, worked closely with Sea Grant in the past, or are currently doing so; if yes, is your most successful collaboration in research, extension, or education?**

Only a limited number of collaborative research efforts were cited. The bulk of these came from the two NOS programs that mentioned several examples of working with Sea Grant's research and the Knauss Fellows. The NMFS program in California also cited a very productive collaboration with Sea Grant researchers. They credit this collaboration to significantly increasing the magnitude and scope of research information relevant to the NMFS mission. The same program mentioned occasionally serving on research review committees for Sea Grant. Only one OAR laboratory mentioned collaboration, and that was with a tsunami hazard evaluation project for small harbors.

Examples of extension interaction were more limited than expected. Two OAR laboratories mentioned being involved with extension; one failed to provide examples of this interaction while the other mentioned educational outreach associated with coastal-inland flooding following a severe storm. One California NMFS laboratory would like more interaction with Sea Grant extension, but are limited on what they can do. This Director is of the opinion that Sea Grant programs in California do not provide extension in the traditional method of serving as a liaison between the research and the commercial and recreational fishery industry. Rather they appear to be concentrating on biodiversity, tourism, sustainability and the like. Other Directors, however, view that this is exactly the direction in which Sea Grant extension should be moving.

- **Do you envision additional collaboration with Sea Grant; if so in research, extension, or education?**

Three OAR facilities, including the two oceanographic laboratories and one of the NOS laboratories see opportunities for collaboration in all three areas. Potential areas for research include cross cutting topics such as coral reef conservation, mitigation of harmful algal blooms, climate change impact on coastal ecosystems, and coastal development. They believe collaboration in establishing research priorities would enhance the breath and reach of research portfolios and reduce duplicative efforts in research and communications. The far-reaching network of extension agents could assist with technology transfer, transitioning predictive tools into an operational mode, and communicating complex scientific information to policy makers.

Three of the NMFS laboratories also expressed willingness for enhanced collaboration. Some concerns were mentioned that Sea Grant is not adequately focused on fishery issues and the extension agents need

to assume more traditional extension activity of working cooperatively with the fishing industry community.

One of the NMFS Directors expressed no intent of working with Sea Grant whereas another NMFS Director and OAR Director saw very little opportunity for close collaboration.

Even those Directors envisioning future collaboration, saw some difficulties. They cite the difficulty of moving funds from the state Sea Grant Programs and the NOAA Laboratories. Collaborative research is also limited because NOAA scientists need to bring their own funds and there is limited opportunity to acquire Sea Grant funding to cover research costs.

- **Is Sea Grant successful in furthering the goals and objectives of NOAA; if yes, can you provide specific examples?**

In research, examples of where Sea Grant furthered NOAA's goals included linking radar rainfall runoff models with biological and pollution models in estuaries and coastal zones, using aquaculture and invasive species research for policy development, and fishery research projects to help develop the scientific basis for managing fishery resources. Of the latter, specific examples include: tracking and trophic dynamics of jumbo squid, bio-economics of rockfish, and acoustic tracking of salmonid fisheries. Whereas much of the research between NOAA and Sea Grant researchers are complimentary, the transfer of research results into NOAA applications is often difficult.

The extension capabilities of Sea Grant are generally well recognized and appreciated within NOAA. Sea Grant was cited by one of the NMFS Directors for bringing together local fishers with NMFS scientists to provide information to the Fisheries Management Council. Sea Grant is also recognized as being very successful in the areas of marine education and ocean literacy.

Two of the NMFS laboratories were less generous in their recognition of Sea Grant's contribution to furthering NOAA goals and objectives.

- **Do you view Sea Grant as being helping in meeting the objectives of your organization; if so, how?**

Not many examples were provided of where Sea Grant is useful in promoting the objectives of the various NOAA laboratories. One example was cited of Sea Grant's value in helping evaluate the effectiveness of the NOAA tsunami preparedness program. Another example was Sea Grant help in the national estuarine eutrophication assessment program where data are solicited from regional and local experts. It was also believed that NMFS could more effectively utilize Sea Grant research in applied fisheries and ecosystem-based management. The latter could be enhanced if a higher priority was placed on Sea Grant research directed toward specific NMFS management and policy issues. This could be done through funding priorities, encouraging researchers to address their work toward these issues, and having a more collaborative work arrangement between Sea Grant and NOAA researchers.

Sea Grant extension helps justify the national investment in weather radars and provides an independent evaluation process for judging the effectiveness of existing preparedness activities such as TsunamiReady. One Director expressed some frustration with extension in that Sea Grant capabilities are primarily concentrated in state programs whereas his laboratory addresses programs of national scope.

- **Have you found Sea Grant supported research projects to be a source of trained personnel in your organization?**

With the exception of the Knauss Fellows, few of the NOAA programs have utilized Sea Grant trained research personnel. A couple of Directors allowed that probably some Sea Grant trained personnel work in their laboratories but do not have the data to suggest how many.

- **Do you see merit in future discipline-focused workshops between NOAA and Sea Grant investigators?**

Of all the questions, this one received the most positive response. With the exception of two Directors, everyone thought a discipline-focused workshop to be a good idea. Such a workshop would provide the opportunity for cross-fertilization of talent and ideas, identify commonalities and avoid overlap in research planning. One Director suggested that for program planning, rather than research planning, these focused workshops should be between staff at the National Program Office levels. Two of the NMFS Directors saw little value in such a workshop. They cite that the academic and NOAA researchers are already quite familiar with the others work and there is frequent collaboration on research projects. Therefore, they see little to be gained.

- **Do you have any recommendations for ways that Sea Grant can further your organization?**

Several of the suggestions for Sea Grant furthering the efforts of a NOAA laboratory centered on funding. Suggestions included modifying the Sea Grant rules to allow NOAA researchers to compete for Sea Grant funding. Another is help to fund graduate students. Suggestions other than funding include exchanges involving Sea Grant scholars and NOAA research centers, using Sea Grant's local research focus to supplement NOAA's large-scale, regional ecosystem research, and finding ways to entrain Sea Grant research into management priorities of NMFS.

In the area of extension, suggestions include focusing Sea Grant extension on NOAA high priority activities, duplicate Sea Grant's successful ecosystem extension activities to climate interests, and mimic the Oregon and Washington approaches for establishing relationships of trust and influence with the fishing industry. Sea Grant needs to expand its research and outreach focus to include a broader constituency that believes Sea Grant's activities are critical to their interests and will lobby Congress to support them. Traditionally, the 'fishery' was extractive resource users (e.g. commercial and recreational fishing), but society has changed to include many other uses such as biodiversity, tourism, existence value, etc.

Simple actions can also help both the collaboration and the furthering of NOAA goals. As one NMFS Director said, "The local extension agent could get to know us and actively promote collaborations not only in extension but also in research and education."

- **How would you best describe Sea Grant?**

Of the eleven respondents, 8 viewed Sea Grant as a partner, ranging from a potential, or good but could be better, to a partner. Two view Sea Grant as a competitor for funding, and one viewed Sea Grant as no impact. Of the 8 viewing Sea Grant as a partner, only 3 cited examples of this partnership in the earlier questions.

Appendix F

Summary of Comments from Interviewees

Numerous interviews were conducted either face-to-face or over the telephone. Included were Hill staffers, both current and previous (John Rayfield, Bonnie Bruce, Eric Webster), NOAA senior management, both current and previous (Mary Glacken, Rick Spinrad, Louisa Koch, Eric Webster), OMB, current and previous (Stuart Levenbach, Emily Woglom), DOC and NOAA budget offices (Gene Lockwood-Shabat and Heidi Keller) and others (Margaret Leinen, Dan Walker).

These individuals obviously had different perspectives of Sea Grant. Several placed Sea Grant's troubles at the foot of OMB, whereas OMB and DOC considered the funding woes of Sea Grant was due to NOAA not being a strong champion of Sea Grant. Several commented that Sea Grant was a good program and a few felt that the Sea Grant model was working; others felt differently. When shown the Ross Heath funding graph (Figure 8), representatives from OMB/DOC believed that the interpretation is skewed by what was included or left out. They offered that:

- 1) If the big ticket items (e.g. satellites) were removed from NOAA's budget and only ORF (Operations, Research, and Facilities) were considered, the Sea Grant budget would look similar to the overall NOAA budget; and
- 2) If funding for the coastal ocean programs were also considered, the funding profile would be much different than presented. Except for the past four or five years, little drop off in funding for coastal issues would be found.

Those interviewed offered a wide range of thoughts and suggestions on why Sea Grant was not achieving broader success. These include:

A. Sea Grant as a Whole

- a. OMB and the Appropriation side of Congress are thought to perceive Sea Grant as a 'local flavor' program since it is implemented through state programs. Although Sea Grant meets the needs of local constituents, it does not really comprise a national program. The beneficiaries are thought to be a large number of small local programs rather than the nation as a whole. It is also believed that OMB and the Appropriators see Sea Grant as an entitlement program or a pass-through program to the states to do whatever they want. Hence Sea Grant is viewed more like an earmark than a competitive program. The NOAA budget people, perhaps aware of OMB's reluctance to fund Sea Grant, have not requested additional funding for Sea Grant.
- b. Sea Grant is viewed as a collection of state and local programs rather than a national program, causing some in OMB to ask "what national benefit is being gained from Sea Grant?" The fact that Sea Grant is perceived as doing a good job in solving state and local issues protects it from budget cuts but its failure to address national problems is an impediment to increased funding.

- c. The current management model of Sea Grant shifts research funding decisions of what best serves the NOAA mission to the states level; some believe that funds are being wasted on Sea Grant research.
- d. There is a perception by some that the amount of funding to Sea Grant programs is due as much to timing as to merit. Those programs in existence from the early days of Sea Grant are thought to get more funding than the newer Sea Grant programs.
- e. Rather than addressing several issues, Sea Grant should focus on a single issue such as the coastal community adaptability to climate change.
- f. Sea Grant needs to demonstrate a return on investment and will need to quantify success tracked over time.
- g. Sea Grant has not done a good job of marketing itself in terms of demonstrating that it is greater than the sum of its parts. The number of publications is not viewed as a serious indicator of impact; trying to compete with NSF on number of publications could be counter-productive. Instead of showing the number of publications, Sea Grant should concentrate on its impact in meeting a national need. It is much easier to generate funding support for a program that is clearly serving needs than one simply doing research.
- h. With the formation of each new program in NOAA, there is a new line item in the budget. When building the budget, the money is allocated to the program most closely identified with a research task; the secondary player, regardless of the size of separation between the two programs, loses out. The NOAA budget is presented as a total initiative but how Sea Grant fits into this budget is not apparent. Building a budget is a bottom-up process. NOAA must first take the initiative and request new funding. In the past several years, NOAA has not done this for Sea Grant. There may be a tendency in NOAA to protect intramural research at the expense of extramural research.
- i. With few exceptions, the universities do not lobby for Sea Grant. In addition, the state and local match is very little. This counters the impression that stakeholders are committed to the success of Sea Grant.
- j. Whereas the current model is workable, there is recognition that a shift to regionalization could be beneficial; in the absence of changing the model, Sea Grant must be sold as a National program and as an integral part of NOAA's outreach and research.

B. Extension and Education

- k. The strength of the Sea Grant program is in extension and education. The strong and well-respected outreach is the area that Sea Grant can best support NOAA. This strength, which is under-emphasized by Sea Grant, is ideally positioned to complement other NOAA activities. Sea Grant extension should be seen as essential to NOAA as the vehicle of extending the results of NOAA research.
- l. Sea Grant needs to establish a niche that ensures that it is the lead player; extension/education is one area in which Sea Grant has a clearly defined lead role and should capitalize on this capability. Sea Grant should recast itself to focus on extension.
- m. Sea Grant needs to be seen as part of the National Coastal Initiatives. Without Sea Grant extension, the NCIs have no connectivity to NOAA managers.

C. Research

- n. By some in NOAA, Sea Grant is not viewed as a real research program, rather is viewed as a competitor.
- o. It is perceived that OMB does not consider research to be an important component to Sea Grant. OMB/DOC establishes new programs for coastal research rather than add money to Sea Grant budget. NOAA requests these new programs believing OMB has a prejudice against Sea Grant. The results are more competition for few research dollars. The OMB bias against Sea Grant has existed for so long that it has taken on cultural overtones.
- p. Sea Grant's research is not viewed as stellar science but rather as being static without the nimbleness to address emerging scientific issues. The research is viewed as "hundreds of mosaic tiles, without the big picture" and fails to address those issues thought important to OMB.
- q. The question of overlap among numerous coastal ocean programs within NOAA must be addressed. The lack of a clear distinction between the research missions of these programs is a problem with Sea Grant funding. Without clear definition, there is overlap in mission and funding. Establishment of new programs in NOAA is in part due to the question raised a few years ago of whether Sea Grant was supporting National priorities or if it was a collection of local programs.
- r. Sea Grant research is similar to other NOAA extramural programs and thus is a target of other programs for funding. Sea Grant's research should be restricted to well-defined, applied efforts that address local needs but ideally with a national application. It must be demonstrated to OMB/DOC that Sea Grant research is of a high priority at the state/local level. NOAA has not made this case for Sea Grant.
- s. Sea Grant funding woes are due to NOAA not requesting new funding for Sea Grant (OMB/DOC); NOAA has never taken ownership of Sea Grant. This may be due to the preference of NOAA to do its science in-house.
- t. Research in Sea Grant would fare better if it were managed by NSGO. Currently there is a loss of message and relevance for the program. If research were handled at the national level, there would be an enhancement of the connection of Sea Grant research and outreach activities to the mission of NOAA.
- u. Amount of funding per state program is considered sub-minimal

D. Support in NOAA, DOC, OMB

- v. Sea Grant is an orphan within NOAA and does not fit well within OAR. In a fairly recent study of NOAA's ocean programs, it was recommended by the committee to move Sea Grant to NOS. Sea Grant, however, indicated that it is a research-based program and would not fit well within NOS; therefore it did not move. One previous senior manager within NOAA believes that failure to move was a mistake. Others argue that Sea Grant should merge with the NOS Center for Sponsored Coastal Ocean Research.
- w. NOAA has very little flexibility in its budget and thus tends to view Sea Grant with some ambivalence and as a small program that is doing some nice things but is of a low priority in terms of funding. OMB is thought not to be highly supportive of research and would rather

put money into “actions” rather than research. Once the budget gets to the Hill, the amount of additional dollars that can be added is relatively small.

- x. The lobbying by Sea Grant Association has been a serious problem in the past. The SGA is occasionally seen as being self-serving and not a team player. This may be part of the reason for NOAA not being more supportive of Sea Grant.
- y. There is little that Sea Grant can do by itself to change the OMB and Congressional bias.

Appendix G

Alternate Sea Grant Models

In Chapter 3, Section B, alternative models for Sea Grant are mentioned. After considering the overall funding problems of Sea Grant, the way in which Sea Grant has operated over the past several decades, and the impressions that we have gained from responses to our questionnaires and to our interviews, the committee believed that it was worthwhile to consider possible alternate models for Sea Grant or perhaps ways in which the current model could be made more effective. Thus we attempted to “think outside the box” with additional models. In the following discussion and tables we consider some of the advantages and disadvantages of the current Sea Grant model and then look at several other possible models, again addressing some of their advantages and disadvantages. Those advantages or disadvantages considered unique to a particular model are denoted with an (U).

Each of the following alternate models would be a significant shift in the way Sea Grant does business. We emphasize that this is not a comprehensive analysis, but the results of a brief brainstorming session. In no way should the number of advantages vs. disadvantages listed here for a particular model indicate that there is a belief that advantages outweigh disadvantages for that model, or vice versa. Also, there is no prioritization among the advantages and disadvantages.

A. Maintaining the Current Sea Grant Model

The current Sea Grant model includes a balance of efforts directed toward research, outreach and education, with to a large extent that balance and decisions concerning how core funding is distributed undertaken at the local level. Some advantages and disadvantages of the current model are presented in the following table.

Maintaining the Current Sea Grant Model

Advantages	Disadvantages
Research targets local area and state needs.	Perception is that Sea Grant research is of limited use to NOAA’s mission (U)
Productive model (measured by research publication output)	Sea Grant not seen as a national program (U)
Research results are transferable beyond the originating Program	Current model removes limited dollars otherwise available for outreach and has not led to increased funding
Research is viewed by Sea Grant Directors to be critical to the overall success of their program. (U)	Inflation will make useful Sea Grant research unaffordable
Research supports young faculty and graduate student training	Sea Grant research is perceived by some as not being of the highest quality
Universities, states, and local constituencies feel that Sea Grant research addressing their needs is of high quality	Small Programs cannot effectively run research competitions (U)
Research encourages Universities to be partners with Sea Grant and provides credibility for the entire Sea Grant program within universities (U)	Sea Grant research is viewed as an entitlement program (U)
Many scientists currently conducting research	Sea Grant research is seen as insignificant at

relevant to coastal / marine issues were supported as students by Sea Grant	some Universities
	OMB feels research directed to local needs should be funded with local not federal dollars (U)

B. Aggregation and Synthesis of Sea Grant Research Outputs and their Impacts

This model basically maintains the current model but would involve the National Sea Grant Office making as a major priority the aggregation and synthesis of Sea Grant research outputs and their impacts. This would be a significant step toward Sea Grant being viewed as a truly national asset and resource. To date Sea Grant has not adequately portrayed or represented either the high quality of Sea Grant research or its highly valuable national impacts. Some advantages and disadvantages of this model include the following.

Aggregation and Synthesis of Sea Grant Research Outputs and their Impacts

Advantages	Disadvantages
All the advantages of the current model	May not solve the entitlement problem
Little disturbance to local programs	Does not address the need for a national research focus
Brings some coherence to the research efforts	Involves added personnel time at the NSGO
Improves the perception of the quality of Sea Grant research	Does not address increased interaction with NOAA laboratories and other entities

C. Regionalization of all Aspects of a Sea Grant Program

In this model a Sea Grant program would represent a region rather than having a separate Sea Grant program in the states as currently exists. A single Sea Grant program would thus represent multiple states, and decisions would be carried out on a regional level by a regional staff. Ideally, the delineation of these regions would be consistent with other coastal regions within NOAA or other such organizations. Some advantages and disadvantages of this model include the following.

Regionalization of all Aspects of a Sea Grant Program

Advantages	Disadvantages
Increase administrative efficiency - more dollars could go to research	States would be less happy to provide match, especially if other states in region balk
Ability to address larger-scale (regional or national scale) issues	May weaken Congressional base of support – looks less like a state earmark
Could address larger-budget issues	There are many mutually-inconsistent regionalization efforts and plans (U)
Could address more interdisciplinary projects	Likely tremendous resistance from current Sea Grant programs
Could answer perception of state entitlement program	University match and infrastructure support (office space and other services) likely to decline (U)

More efficient oversight by the NSGO	Local private match would likely decline (U)
May broaden Congressional base of support – looks less like a state earmark	Hard to run outreach regionally (U)
There are already regionalization efforts and plans (ocean action plan, NOAA, etc) (U)	Many issues are state-level or smaller; can't generate interest at the regional scale (U)
High quality specialized research selection panels can more easily be run	Perceived injustices in funding could occur
	It would weaken Sea Grant's unique niche of state- and local-level engagement (U)
	Would need to overcome inertia
	Local university capacity-building benefit of Sea Grant could be lost (U)

D. Maintaining Current Sea Grant Programs for Outreach and Education but Managing Research Grants at the Regional Level

The current model of providing extension and education to the local and state communities would continue to exist. All decisions regarding funding for research would be done at a regional level. An obvious advantage to this suggestion is to satisfy the question of entitlement, which is often raised against Sea Grant. There are other advantages and disadvantages. Many of these were considered in the previous section.

Regionalization of Only Sea Grant Research

Advantages	Disadvantages
Some small programs are too small to maintain an effective research program on their own	Could impact state match
Can address perception of state entitlement program	May weaken Congressional base of support
Consistent with NOAA's push for regionalization (U)	Inconsistent regionalization efforts (U)
Increased efficiency in oversight by national office	Resistance from current Sea Grant programs
Increase in efficiency in general	Could impact infrastructural support
Ability to address larger scale problems	Perceived injustices in funding
More opportunities for small states	
More money directed toward research	
Could address interdisciplinary projects more effectively	
High quality specialized research selection panels used	

E. Maintaining Current Sea Grant Programs for Outreach and Education but Managing Research Grants at the National Level

The current model of providing extension and education to the local and state communities would continue to exist. All decisions regarding funding for research would be done at the national level. An obvious advantage to this suggestion is to satisfy the question of entitlement as well as that Sea Grant does not focus on national issues, which is often raised as a criticism against Sea Grant. There are other advantages and disadvantages. Many of these were considered in the previous section.

Nationalization of Only Sea Grant Research

Advantages	Disadvantages
Would address perception that Sea Grant is not a national program (U)	Could impact state match
Would address perception of state entitlement program (U)	May weaken Congressional base of support (U)
Some small programs are too small to maintain an effective research program on their own (U)	Resistance from current Sea Grant programs (U)
Increased efficiency in oversight by national office (U)	May not as adequately address local problems (U)
Increase in efficiency in general	Could impact infrastructural support
Ability to address larger, national scale problems (U)	Perceived injustices in funding
More opportunities for small states	
More money directed toward research (U)	
Could address interdisciplinary projects more effectively (U)	
High quality specialized research selection panels used	

F. Eliminating Research and Focusing on Outreach and Education

Sea Grant has long profited from the inclusion of education and extension along with research. One option is the elimination of research in order to concentrate on Sea Grant's universally recognized strength of extension and education, which would still be managed at the local level. Some advantages and disadvantages of this model are given below.

Elimination of Research and Focusing on Outreach and Education

Advantages	Disadvantages
Strengthens and provides more money for outreach (U)	Threatens the status quo
Sea Grant could more easily be recognized as the extension arm of NOAA	Sea Grant would not be a well-rounded program (U)
NOAA and OMB already see the benefit of Sea Grant extension	Targeted research addressing local community needs would be lost (U)
Parts of NOAA would see Sea Grant more as a partner and less as a competitor for research dollars (U)	University lobbying for NOAA budget increase could be marginalized (U)

Administrative requirements of each Program would decrease	Loss of junior faculty and some graduate student research (U)
Sea Grant would not be seen as trying to be everything to everybody without sufficient funds to do all.	In some areas (coastal and near shore research), there's no significant alternative source of research funding (U)
	Elimination of research could relegate Sea Grant to a social science part of the university (U)
	Elimination of research would not guarantee growth in Sea Grant and might actually reduce funding to Sea Grant (U)

G. Increasing Research Funding at the Expense of Outreach

The opposite consideration to F. above is to increase the funding of research at the expense of outreach. For this consideration, we assume that research would be increased to 70-80% of the core federal funding. The loss of significant federal funding for outreach could be compensated for by increased local funding. All of the efforts would be managed at the local level.

Increased Research Funding at the Expense of Outreach

Advantages	Disadvantages
All the advantages of option A, only more so	Does not address OMB's perception of Sea Grant research (U)
More rapid development of knowledge about coastal marine processes and issues	Largely takes away the component of Sea Grant most appreciated nationally (U)
More funding for graduate education and development of future scientists	Could result in loss of a critical piece of Sea Grant, the part which helps drive its success (U)
More funding for junior faculty who are under increasing pressure to receive grants	Concept would take a few years to shift to substantially more local funding (U)
University administrators are expected to be very supportive. This should lead to increased university support for NOAA/Sea Grant	High risk, assumes that local match could offset the loss of federal funding (U)
Local funding might be able to be obtained for outreach more easily than research	Threatens the status quo
Small programs will be able to run adequate research competitions, which they cannot do at present	Re-defines the essence of Sea Grant (U)
Increased numbers of publications will lead to better reputation for Sea Grant in academia	
Sea Grant will be able to do more of something it does well (peer-reviewed publications for an inexpensive price)	

Appendix H

Members of the Committee to Review Sea Grant Research

Robert A. Duce, Chair, is Distinguished Professor Emeritus of Oceanography and of Atmospheric Sciences at Texas A&M University, where he was Dean of the College of Geosciences from 1991 to 1997. From 1987 to 1991 he was Dean of the Graduate School of Oceanography, University of Rhode Island. He completed a Ph.D. in nuclear chemistry at MIT in 1964 and also served on the faculty at the Universities of Rhode Island and Hawaii. He is a member of the National Sea Grant Advisory Board and is Past-President of SCOR, of The Oceanography Society (TOS), and of the International Association of Meteorology and Atmospheric Sciences. He is an officer of the International Geosphere/Biosphere Program Scientific Committee and was Chair of the UN Group of Experts on the Scientific Aspects of Marine Pollution (GESAMP). He has been a member of the NAS/NRC Ocean Studies Board and the Board on Atmospheric Sciences and Climate, is a National Associate of the National Academies and has chaired several NRC committees. He has over 280 publications in marine and atmospheric chemistry and was awarded the Rosenstiel Award in Marine and Atmospheric Chemistry. He is a Fellow of the AGU, AMS, AAAS and TOS.

E. Gordon Grau is Professor of Zoology and a member of the faculty of the Hawaii Institute of Marine Biology of the University of Hawaii's School of Ocean and Earth Science and Technology. He obtained a B.S. in Biology from Loyola College of Maryland, an M.S. in Science Teaching from Morgan State University and a Ph.D. in Biology from the University of Delaware, and was an NIH Postdoctoral Fellow at the University of California, Berkeley. His studies focus the environmental physiology and comparative endocrinology of euryhaline fish. He has served as the Director of the University of Hawaii Sea Grant College Program since 2000. He has also served as Distinguished Visiting Professor at the Physiology Department of the University of Alberta and at the Ocean Research Institute of the University of Tokyo. Professor Grau has also served on the Honolulu Charter Commission and was honored as a University of Hawaii Regents Medalist and as a Fujio Matsuda Scholar. He serves on the Board of the International Federation of Comparative Endocrine Societies and as President of the Sea Grant Association. He is the author of over 160 scientific papers and has served as mentor and graduate chair for more than 35 graduate students and postdoctoral fellows.

Scott Nixon is Professor of Oceanography and UNESCO/Cousteau Chair in Coastal Ecology and Global Assessment at the University of Rhode Island, where he has been on the faculty since 1970. He took his Ph.D. in systems ecology at the University of North Carolina- Chapel Hill in 1969 and has studied a variety of coastal ecosystems ever since. He served for 16 years as Director of the Rhode Island Sea Grant College Program and for many years as Co-Editor-In-Chief of *Estuaries and Coasts*, the journal of the Estuarine Research Federation. He has published over 100 scientific papers and served on numerous committees of the U.S. National Research Council, including the Ocean Studies Board, the Everglades Restoration Science Review Committee (vice-chair), the Florida Keys Carrying Capacity Model Review Committee (chair), and the Coastal Louisiana Restoration Plan Review Committee. He has been recognized with several awards, including the Ketchum Award for excellence in coastal research from the Woods Hole Oceanographic Institution, the New England Estuarine Research Society Lifetime Achievement Award, and the Odum Award from the Estuarine Research Federation for lifetime achievement. He is a National Associate of the National Academies. He has graduated over 30 M.S. and Ph.D. students.

Nancy N. Rabalais is the Executive Director of Louisiana Universities Marine Consortium and a Professor. Dr. Rabalais' research interests include the dynamics of hypoxic environments, interactions of large rivers with the coastal ocean, estuarine and coastal eutrophication, benthic ecology, environmental effects of habitat alterations and contaminants, and science policy. Dr. Rabalais is an American Association for the Advancement of Science Fellow, a National Associate of the National Academies, past Chair of the Ocean Studies Board of the National Research Council, a Past President of the Estuarine Research Federation, and an Aldo Leopold Leadership Program Fellow. She received the 2002 Bostwick H. Ketchum Award for coastal research from the Woods Hole Oceanographic Institution, the 2008 Ruth Patrick Award from the American Society of Limnology and Oceanography, the 2008 Clarke Prize from the National Water Research Institute, and several research and environmental awards for her work on the causes and consequences of Gulf of Mexico hypoxia. She earned a

Ph.D. in Zoology from the University of Texas at Austin in 1983, and her B.S and M.S. in Biology from Texas A&I University, Kingsville.

William L. Stubblefield is a County Commissioner of Berkeley County, West Virginia, one of the fastest growing counties in the U.S. Rear Admiral Stubblefield retired as Director of NOAA's Ship and Aircraft Operations and Director of the NOAA Commissioned Corps. Following his retirement, he was elected an officer on the National Board of Directors of the Military Officers of America Association. During his 35 years as a commissioned officer in the Navy and NOAA, he authored over 30 scientific papers on near-shore marine processes, commanded oceanographic vessels, and served in several senior positions in NOAA. He has a PhD from Texas A & M University. He is married to Dr. Bonnie A. McGregor who was the Associated Director and the Director of the Eastern Region of the U. S. Geological Survey.

Judith S. Weis is Professor, Department of Biological Sciences, Rutgers University, Newark NJ, and served as Associate Dean. She also has been an American Association for the Advancement of Science (AAAS) Congressional Science Fellow, Program Director at NSF, and visiting scientist at EPA. She has published ~200 refereed papers, focusing mainly on stresses in estuaries and their effects on organisms, populations and communities. She has just published her first book, "Salt Marshes: A Natural and Unnatural History". She served on the Board of Directors of the Society of Environmental Toxicology and Chemistry (SETAC), Association for Women in Science (AWIS) and American Institute of Biological Sciences (AIBS); Chair of the Biology Section of AAAS; and President of AIBS. She is a fellow of AAAS, served on advisory committees for EPA, and has been a member of the Marine Board of the National Research Council. She serves on the National Sea Grant Advisory Board.

Appendix I

Sea Grant Research Funding as Recorded by NIMS

Sea Grant's legislation describes three programmatic elements of the National Sea Grant College Program: the state network of programs, national Fellowship programs, and regional or national strategic investments (NSIs). NIMS tracks grant awards and project activities in all three areas.

Funding that goes directly to the state programs in the form of Omnibus grants is recorded in NIMS as "SG-CORE" funding, and is further broken down by type of activity (Research, Education, Management, Extension, Communication).

Fellowship grants are recorded in NIMS by the name of the Fellowship Program (e.g., Dean A. Knauss Fellowship), and are categorized as Education. Sea Grant and NOAA Fisheries also jointly fund Graduate Fellowship Programs for Ph.D. students in population dynamics and marine resource economics.

The term NSI is sometimes used as a shorthand term for national competitions run by the national office, but the term is really broader than that. All other grants of Sea Grant appropriated funds are NSIs. They are labeled in NIMS as "SG-" plus a shorthand name for the strategic investment (e.g., "SG-BIOTECH", "SG-FET" [for Fisheries Extension Enhancement], "SG-REGIONAL"), and broken down further by type of activity (Research, Extension, Education, Communication).

When this report discusses all Sea Grant funding, it is referring to all of the above. When it discusses Sea Grant core funding, it is NOT including Fellowship or NSI funding.

The legislation also allows Sea Grant to accept money from other federal sources and pass it through as grants to the Sea Grant Programs or others. These funds are called "pass through" funds and are recorded in NIMS with shorthand names for the source and purpose of the pass through funding. Pass through funds are not considered by NIMS to be Sea Grant funds because they are not part of the Sea Grant appropriations.

Figure I-1 below presents the sum of core, NSI, and pass-through research funding since 1995. **These data do not include other research funds that individual programs obtain directly from sources outside Sea Grant.** From this figure it appears that the total Sea Grant research funding handled through the NSGO from 1995 to 2002 was fairly constant, but from 2003 to 2007 this total has decreased.

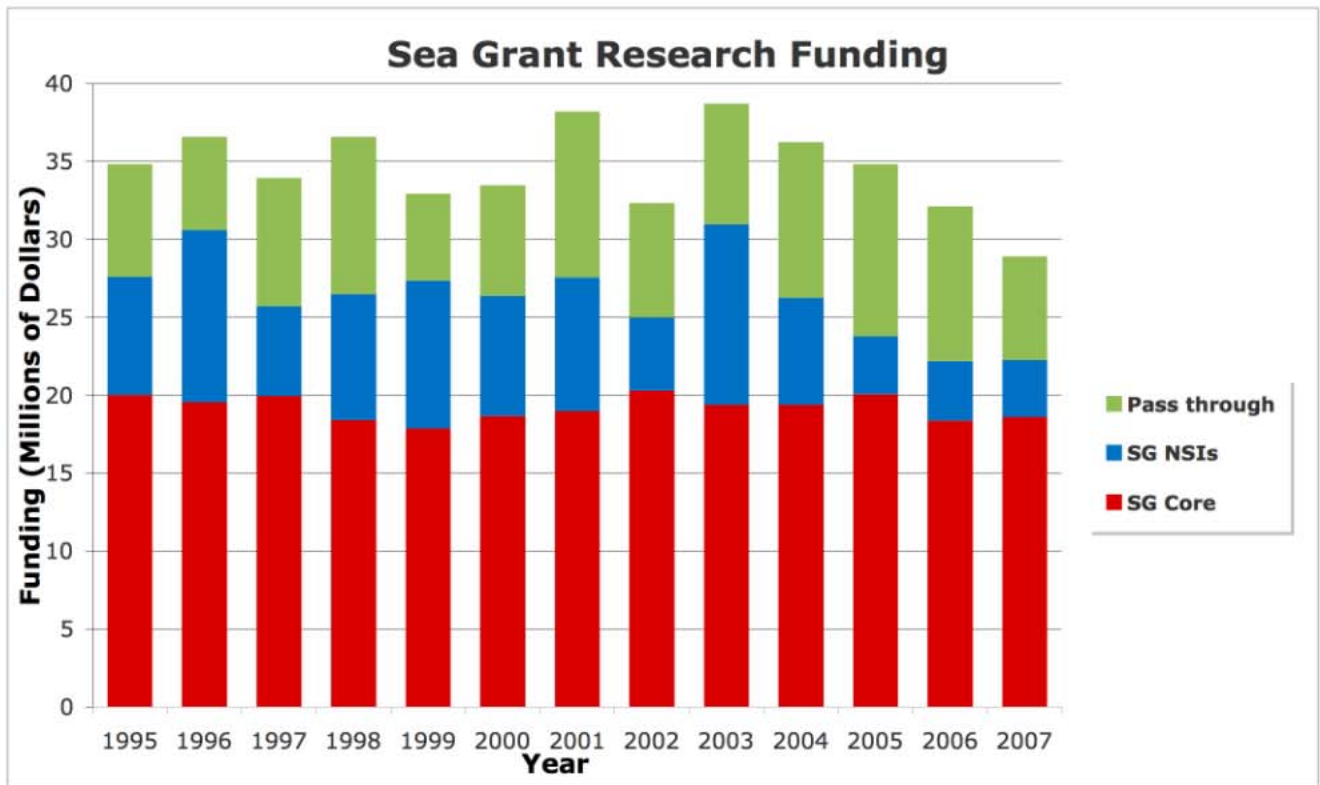


Figure I-1. Core, NSI, and pass-through research funding, according to NIMS.

Appendix J

Acknowledgements

We would like to acknowledge the many individuals who worked with us in the development of this report. Of particular importance is Dorn Carlson of the National Sea Grant Office, whose efforts have been Herculean. He worked with us during his vacations, on weekends and evenings, while also undertaking his many other responsibilities at the National Office. His willingness to answer many questions, dig out obscure data, and make valuable suggestions has been invaluable.

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We also thank the many individuals who we interviewed in person or on the telephone. These included persons (in current and previous positions) representing Congressional staff, the Office of Management and Budget, NOAA and Department of Commerce budget offices, senior managers in NOAA, and agencies outside of NOAA but possessing knowledge of Sea Grant, such as NSF. Their candid responses became a critical part of our discussion and conclusions

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