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AN EVALUATION OF THE NATIONAL SEA GRANT PROGRAM

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The National Sea Grant College and Program Act of 1966, Public Law 89-688, established a program which has funded a great many marine oriented projects. The concept for this program was originally envisioned by Athelstan Spilhaus in 1963, who hoped for the same achievements for the sea as had been derived from the land with the old Land Grant Program which was established by the Morrill Act in 1862. The idea of these "Sea Grant Universities" was to take the results of scientific research and apply them practically to the various marine related activities aimed at deriving benefit from the sea.

In 1965 the University of Rhode Island sponsored a conference on the idea of Sea Grant. The concept was well received, and in the following year the Sea Grant legislation sponsored by Senator Claiborne Pell of Rhode Island and Florida's Congressman Paul Rogers was passed. The National Science Foundation was originally assigned to administer the Act and they made the first grants in January, 1968. Control of Sea Grant was passed to the National Oceanic and Atmospheric Administration, where it remains today.

The National Sea Grant College and Program Act gave authority and funding to the sea grant concept, but the language of the legislation was too vague and all-encompassing to clearly define the direction in which the program should function. The procedural matters became set, but the management remained loose and a considerable amount of autonomy was

given (or abandoned) to the individual institutional coordinators of the program. Successive Sea Grant conferences were held where the scope and direction of the program were debated time after time, but the actual operation continued on in an anarchial fashion. This paper will discuss the philosophies and management of the Sea Grant program and their effectiveness in meeting the original goals of the program as they were perceived when the National Sea Grant College and Program Act of 1966 was being formulated.

Structure and Operation

The Sea Grant Program function under the influence of a number of distinct groups. Each has its own responsibilities, although these responsibilities are sometimes poorly defined and overlap.

The Office of Sea Grant is the nominal administrator of the entire program. They see themselves as responsible for the broad direction and coordination of the program, as the group to establish management goals and objectives. They share in the establishment of program goals and objectives. Finally, the Office of Sea Grant "is responsible for quality, balance, coordination, and overall direction of the combined Sea Grant programs conducted by the academic institutions participating in the National Sea Grant Program."¹

To aid the regular staff at the Office of Sea Grant, an advisory panel, composed of distinguished members of marine related organizations and businesses, has been set up. This

National Sea Grant Advisory Panel "provides counsel to the Office of Sea Grant in the development of program plans, goals, objectives and priorities and in the shaping of management policies."² This group provides an important outside perspective.

Another group which was later formed is the Council of Sea Grant Program Directors. The directors of the various Sea Grant programs- Sea Grant College, Sea Grant Institutional, and Coherent Project- make up this council and provide feedback to the Office of Sea Grant. The Council provides the forum for the Directors to discuss their problems and discuss their ideas.

The procedure for getting a project funded is generally a multi-tiered review process. Projects are usually initiated at the researcher level. The researcher submits his proposal for review within his institution. It may be approved as is or he may be asked to revise it. The Sea Grant coordinator is given much responsibility in this process. Once a proposal receives internal approval, it is sent to the Office of Sea Grant. They send out copies to reviewers (expert in the appropriate areas) across the country. They also send a team to the institution which allows the researcher to defend his proposal as a valuable project.

The basic project selection procedure varies somewhat between the different types of programs within which Sea Grant disposes of grant money. The type of program that an

institution falls under depends upon the degree to which it has developed its marine related programs. The four categories are Sea Grant Colleges, Institutional Support, Coherent Projects, and Projects.

Sea Grant Colleges are designated by the Office of Sea Grant as a result of their overall excellence in operating a complete Sea Grant program. They must have received Institutional Support for at least three years before being designated a Sea Grant College, and such designation brings with it priority of support. In 1972, the first four Sea Grant Colleges were designated: Oregon State University, the University of Rhode Island, Texas A&M University, and the University of Washington. In 1973 the University of Hawaii and the University of Wisconsin System were added and in 1974, Scripps of the University of California.

Institutional Support is given to an educational institution "which has an existing broad base of competence in marine affairs. To qualify, the institution must make a positive, long-range commitment to Sea Grant objectives, as evidenced by commitment of the institution's own resources in the form of matching funds, creation of the organization necessary for management of the Sea Grant Program, establishment of interdisciplinary research teams, and development of advisory service mechanisms for strong interaction with marine communities in its region."³ Those universities receiving Institutional Support are expected to assume responsibility for planning and

carrying out their own broad-based and relevant program.

Coherent Project support is designed to accommodate those institutions whose limited marine affairs competence prevents them from achieving Institutional status, but which are capable of operating a productive program in one or several marine related areas.

Project support is given to individual researchers for clearly defined projects to be accomplished in a certain time frame. Project funding is determined on an individual project basis, rather than on a broader program basis.

As Sea Grant programs are partially funded by the states, there is by necessity some university-state interaction. The attitude of the state varies with the existence of a Sea Grant program and with the category of program.

States that do not have a Sea Grant program exhibit a state-academic conflict as to the perception of needs. There may be competition for funds and in some cases (particularly with non-coastal states) a lack of relevant Sea Grant focus.

States that have Coherent Projects or Institutional Programs often have great expectations for returns but get instead results which are unresponsive to their needs. This is more than likely due to an insufficient amount of time for the program/project to work.

Those states containing Sea Grant Colleges generally have more confidence in the overall program, although no guarantee of relevance to state needs.⁴

The structure of the overall program and within each category encourages the independence of traditional academia with relevance to a real-life problem.

The Act

The National Sea Grant College and Program Act of 1966 is actually an amendment to the Marine Resources and Engineering Development Act of 1966 and appears formally as "Title II - Sea Grant Colleges and Programs". The Act passed through Congress surprisingly quickly, due to the work of its sponsors- Pell and Rogers- and perhaps due to its flowery do-good language which approached Motherhood and Apple Pie. The generally language unfortunately left the program wide open and free to dilute itself beyond the point where it could still bring a good return on the investment.

The preliminaries in the declaration of purpose in the Act cite marine resources as a "largely untapped asset of immense potential significance", say it is in the national interest to develop the capabilities to use these resources, declare that the use of these resources will be of great benefit, and observe that the best means to make use of these resources is through a sea grant program. And then "it is the purpose of this title to provide for the establishment of a program of sea grant colleges and education, training and research in the fields of marine science, engineering, and related disciplines".

This section in the Act on declaration of purpose reflects

the cause for much of the controversy and misconceptions about the results Sea Grant is to produce. It may also have been responsible for misdirecting the overall management policies of the Sea Grant Program. The Act gives the impression that the marine environment holds vast wealth and that the Sea Grant Program is the magic key to unlock the "largely untapped asset of immense potential significance". In reality, man has been exploiting (and overexploiting) the marine environment for a great period of time. Other similar programs have been operational without achieving overnight success. Congress should have taken a more realistic look at actual marine resource potential and written a more limited and well defined piece of legislation. The supposed easy benefits could have led the administrators of the program to believe the problems were not so difficult and therefore the solutions would fall into place with a minimum of management. Creating false expectations which remain unfulfilled may help a program get started quickly but hurts the program in the long run.

Further on in the Act the functions of the program are specified: to provide for "the education of participants in the various fields relating to the development of marine resources; ... (by) initiating and supporting necessary research... aimed at practices, techniques, and the design of equipment applicable to the development of marine resources; and ... (through) instruction, practical demonstrations, publications, and otherwise, ... with the object of impart-

ing useful information to persons currently employed or interested in the various fields related to the development of marine resources, the scientific community, and the general public".

This simplifies down to the three basic Sea Grant functions of research, advisory services, and education and training. Research includes marine resources development, social, economic and legal studies, marine technology research and development, and marine environmental research. Advisory services breaks down into field advisory services and communications services. Education and training covers professional education, vocational marine technician training, continuing education, and public education. All three areas are considered essential for a complete Sea Grant program.

One of the key phrases used in the Act is "the development of marine resources". This term is used in each of the specified functions and therefore is very important. It is defined in the Act to mean

scientific endeavors relating to the marine environment, including, but not limited to, the fields oriented toward the development, conservation, or economic utilization of the physical, chemical, geological, and biological resources of the marine environment; the fields of marine commerce and marine engineering; the fields relating to exploration or research in, the recovery of natural resources from, and the transmission of energy in, the marine environment; the fields of oceanography and oceanology; and the fields with respect to the study of the economic, legal, medical, or sociological problems arising out of the management, use, development, recovery, and control of the natural resources of the marine environment;

Although this definition is very broad, it is not being strictly adhered to by the Sea Grant Program. Certain fields, such as oceanography, which are included in the above definition, are sometimes excluded from funding. NOAA's program description says that "The Sea Grant Program does not, as a general rule, support graduate education programs in physical, biological, chemical, or geological oceanography".⁵ This policy may have resulted from a desire to maintain "oceanography" and the resource oriented "Sea Grant" as separate entities, but John Knauss believes we may be at the stage where this policy no longer performs a useful function.⁶ Some of this may be derived from the notion that oceanography is a basic (as opposed to applied) science, but the Office of Sea Grant is not consistent because the University of Alaska has some Sea Grant funded projects which are apparently basic physical oceanography.⁷

Going in the other direction from the above definition of the term "development of marine resources" we can discover Sea Grant funded projects which obviously do not satisfy the "scientific endeavors" part of the definition. The Office of Sea Grant defends such low level technical information reports as needed by the public. Institutions may allocate certain portions of their money to rapid response non-designated funds.⁸ Such practices dilute the available resources and apparently do not ensure compliance with the word and intent

of the Act.

The original Act and subsequent amendments authorized the following amounts of money to be used by the Sea Grant Program: 1967- \$5 million, '68- \$15 m, '69- \$6 m, '70- \$15 m, '71- \$20 m, '72- \$25 m, '73- \$30 m, '74- \$30 m, '75- \$40 m, '76- \$50 m. All of this money has not been spent, especially so in the most recent years.

The amendment made in 1973, Public Law 93-73, includes provisions for "a study of the means of sharing, through cooperative programs with other nations, the results of marine research useful in the exploration, development, conservation and management of marine resources.

Development of the Sea Grant Philosophy

The Sea Grant philosophy was born in Athelstan Spilhaus' mind with the aid of his knowledge of the Land Grant philosophy. It is sometimes mistakenly assumed that the Sea Grant Program does or should follow the Land Grant Program. The Sea Grant Program is much broader in scope, and there are other differences (such as common ownership of the ocean versus private ownership of the land) which make a comparison of the two similarly named programs invalid. The Land Grant Program did not have so much expected from it in such a short period of time as has Sea Grant.

The first formal expression of sea grant philosophy occurred in October of 1965, when a National Conference on

the Concept of a Sea-Grant University was held in Newport, Rhode Island, to discuss the idea of sea grant colleges. After writing in 1964 - "The sea-grant college would focus attention on marine science and it would develop strengths in the applications of marine sciences in colleges of aquaculture and ocean engineering."⁹, Dr. Spilhaus again stressed ocean engineering and aquaculture in his address to the conference. In addition, he expanded upon a broader interdisciplinary role:

The sea-grant colleges not only would concentrate on applications of science to the sea, such as prospecting underwater, mining, developing the food resources, marine pharmacology and medicine, shipping and navigation, weather and climate, but they would relate these to the natural sciences which underlie them; to the social sciences, economics, sociology, psychology, politics and law, as they are affected by and, in turn, affect the occupation of the sea. They would also be associated with the liberal arts - literature, art, and history - which describe man's relation to the sea and enhance his enjoyment of it.¹⁰

Senator Claiborne Pell spoke of the advances made under the Land Grant Program and elaborated on the bill he was sponsoring in the Senate. He further emphasized the great potential of the oceans.

Harve J. Carlson, of the National Science Foundation, spoke of the need for "1) More highly trained, imaginative persons to attack the more advanced theoretical aspects of physical oceanography; and, 2) More outstanding engineers to translate the work of these scientists into practical accomplishments."¹¹

Other distinguished persons spoke of the increasing importance of the sea in an era when land resources were being strained. This conference took place during the period when the National Sea Grant College and Program Act was being considered in Congress, and therefore reflects the sentiments of the people involved and interested in the program at that time.

A second Sea Grant Conference was held in 1968 after the Sea Grant Program had had a chance to become operational and after \$5 million had been dispensed. The discussion at this conference showed that the management and direction of the Sea Grant Program had not coalesced at that time. The objective of the conference was to further develop and clarify "the shape and magnitude of its (Sea Grant's) future".¹² The General Chairman summed up the theme for the conference as "how can we define and devise a sea grant program that will meet the challenge of the future, but yet not become so diverse and fragmented that it will be indistinguishable from other programs supporting marine sciences."¹³ Further on he expressed his ideas on the purpose of Sea Grant. "To me, sea grant means a continuing attack on the variety of problems man faces in better utilizing the ocean and its coastal regions for non-military purposes."¹⁴

After the second conference, additional ones were held regularly, usually on an annual basis. There has been a continuing need for the conferences because the Sea Grant philosophy has been continually developing and evolving.

Specific content from these later conferences will be discussed with the appropriate topic later in this paper.

After beginning their administration, the Office of Sea Grant began to develop their ideas and philosophy on the Program. In May 1972 the Department of Commerce and the National Oceanic and Atmospheric Administration published "The National Sea Grant Program: Program Description and Suggestions for Preparing Proposals" as a general description of the program and an aid to those wishing Sea Grant funding.

Within the introduction of this publication is a statement of purpose: "The purpose of the Act is to accelerate national development of marine resources, including their conservation, proper management, and maximum social and economic utilization."¹⁵ This derivation of purpose is as open-ended and vague as the wording in the legislation, and therefore is of no help as guidance in establishing program objectives.

The description stresses that conventional problem solving techniques may not be adequate to accomplish Sea Grant objectives: "Many marine resource problems cannot be solved, or opportunities realized, without new approaches to marine and coastal legal, institutional, or economic structures."¹⁶; and, "The systematic, multidisciplinary approach necessary to achieving Sea Grant goals . . . require a kind of organization and reorientation to which most institutions of higher learning are not accustomed."¹⁷

The publication further predicts that "it will take decades for the Sea Grant mission to be accomplished in any single marine area of the nation."¹⁸ It is a good sign that the Office of Sea Grant recognizes that there are substantial obstacles to overcome before significant results can be realized and that it will take time to achieve those results.

Institutional Program Scope

With the working management of the Sea Grant Program left up to the individual institutions, it is necessary as part of an overall evaluation to look at the make-up of those regional programs.

As specified in the Act, Sea Grant consists of three basic functions - education, research, and advisory services. All institutions designated as Sea Grant Colleges and those receiving Institutional Support are required to incorporate all three functions within their programs. This much, then, they have in common.

The education and training portion greatly enhances the probability for success of the program for long term results, because it ensures that competent people will be available to work in marine fields, and further maintains competence through conferences and other forms of continuing education. The central role of research in expanding knowledge needs no comment. The advisory service function of Sea Grant sets it apart from other marine related funding programs, and it is perhaps the Sea Grant function of greatest potential benefit.

Howard Eckles described marine advisory services as "informal educational actions that help people solve practical problems by transferring information to users and by communicating needs to researchers and managers."¹⁹ Those people who are involved in Sea Grant's advisory service programs stress the need for communication in both directions between researcher and user, so that the scientist works on relevant problems and so that the user actually receives the newly found knowledge and aid in putting it into actual practice.^{20,21}

The function of advisory service is a people intensive regional activity and so is best managed on a regional level. Successful programs have depended on a good personal relationship between advisory agent and user of the sea to achieve efficient two-way information transfer.

Within the three basic functions, each Sea Grant institution has developed unique programs. The following brief descriptions are examples of two programs which have been evolving since the inception of Sea Grant - those of the University of Rhode Island and Oregon State University.

Rhode Island's Sea Grant College Program is "strongly reflected in the goals and commitments of six of the University's eight Colleges".²²

Research is conducted in two principal areas. The first, coastal zone management, deals with the economic and social development of the region's coastal states, where strong

population pressures affect the marine environment. The second includes the various aspects of the New England fisheries.

The educational component is designed to meet the need for manpower to work the sea and to manage marine resources.

The advisory service operates to distribute information to the public and to identify the public's needs.

The Rhode Island program contains five basic components.

- 1) Educational and advisory services - PhD and Master's programs, conferences, technical programs, state and regional oriented marine advisory services
- 2) Coastal resources - integrated systems view of Narragansett Bay (physical - biological - economic - social)
- 3) Natural fisheries
- 4) Aquaculture - lobster, salmonoid
- 5) Marine foods and drugs

Oregon State University's Sea Grant program was based on a similar existing state program and places emphasis on responding to the priority needs of the region. Planning is stressed and five-year plans have been completed. "We will emphasize the Sea Grant functions of research, education and advisory services, not as separate segments, but as integral parts of all 51 projects."²³

Research is organized around two basic areas. "Food from the Sea" includes aquaculture, ocean productivity and fisheries, and marine product development. The other area is "Coastal Zone Environment".

The educational function includes programs for technician training and professional education in ocean law and marine resource management.

As the program has matured in Oregon, a greater portion of its funds have been devoted to its marine advisory services.

Diversity and Uniqueness

If the Sea Grant Program attempts to achieve beneficial results in all of the areas that were included in the Act, it will by necessity become an extremely diverse program. The Sea Grant Program has been billed as one that can be distinguished from other marine funding programs. It is extremely difficult to achieve significant results in a wide range of fields with unique goals and methods, even if funding is unlimited. When the funding is limited, the task is almost impossible.

One of the principle problems with starting a broad multifaceted program is that many different people and programs will be involved and unless they are all carefully managed, they will approach the task at hand as they have always approached the problems previously presented to them. However, the Sea Grant Program is designed (in theory) to achieve its greatest potential through new and innovative systems solutions. This is unfortunate because it has generally been the policy to leave Sea Grant programs largely unmanaged. Specific projects by specific researchers tend to remain isolated. There does not appear to exist a coherent framework for piecing all the fragments together.

In each area that Sea Grant involves itself there exist agencies and institutions whose primary concern is that area, and which may be in competition or conflict with the Sea Grant activities. Likewise in each area are groups of individuals with vested interests who will tend to dominate the activity within that area and who are likely to impede an objective systems approach to the problems within the area. Although the idea of Sea Grant is to take people with a wide variety of competences and have them work together to solve one problem situation, the system most frequently becomes segregated by discipline.

Sea Grant projects have been funded in a myriad of fields. A number of the more important ones are: aquaculture, shoreline processes, coastal zone management, transportation systems, recreation, commercial and sport fisheries, mineral resources, law and socio-economics, environmental systems, biomedicinals, ocean engineering, and applied oceanography. Each topic has its own story.

The area of coastal zone management is relatively new (in popularity) and is an area where traditional planners are lacking in expertise. It is an area where Sea Grant funded expertise should be able to provide a multi-disciplinary problem solving analysis to aid the planner. But does it work? Joel Goodman believes that the university Sea Grant programs are not fully focused on state and regional programs. He stated that the Sea Grant Program "was not

sufficiently broad, flexible, well funded to meet the coastal zone research needs of the state".²⁴ While much of the problem may lie with the state itself, there is apparently some lack of understanding between the state and the academic community. In the Fourth National Sea Grant Conference, William Gaither summed up the discussion on coastal zone management with two problems: 1) State and regional planners don't know what Sea Grant can do for them, and; 2) Sea Grant programs are not directed at significant problems - which may be because of narrow traditional disciplinary research.²⁵

In some cases coastal zone planners apparently feel threatened by what Sea Grant has to offer. Edward Stephan addressed a Sea Grant audience - "Let me emphasize once again that hard science guidance is desired from Sea Grant. Political, social and economic guidance locally is neither needed nor desired from Sea Grant."²⁶ Needless to say, this type of attitude stymies the interdisciplinary systems approach.

Fortunately, everyone does not share the same thoughts. One state planner observed that because coastal zone management agencies must sometimes occupy most of their time fighting brush fires, Sea Grant people can ask questions and then provide answers for long term planning.²⁷ The potential for Sea Grant benefit is there.

Besides contributing directly to coastal zone management, the Sea Grant education and training function can, if so directed and carried through, have an effect. Professor Judith Kildow of

the Massachusetts Institute of Technology believes that the university can be valuable for training people to solve broad coastal zone problems rather than narrow local problems. This same university background would help ensure that the research would get to the people who could use it.²⁸

Perhaps the first area that comes to mind when thinking of Sea Grant research projects is aquaculture, or the farming of marine organisms. Aquaculture is a relatively new field in this country, although commercially viable operations are in existence for some species. Aquaculture has achieved more widespread acceptance in some foreign countries, notably Japan.

Although a great many aquaculture projects have been carried out, the overall results have been less than some expected. Harold Goodwin of the National Science Foundation offered one insight. "One purpose of Sea Grant was to create multi-disciplinary teams able to take on all aspects of a system - in this case, and aquaculture system. Our success has been spotty, to say the least. In most cases, the biologists have continued to dominate aquaculture without sufficient help from engineers, economists, sociologists, lawyers, and other critical specialties."²⁹

Others see aquaculture as part of the answer to the world's increasing food requirements, but don't feel that sufficient effort is being put into the development thereof. In the Fourth National Sea Grant Conference Jack Davidson states

"However, our era does not appear to be one of large far reaching social commitment but a period in which we must proceed by small steps with the funding for subsequent steps dependent upon short term results."³⁰ This observation of incremental planning and management holds true for almost every area in Sea Grant and is one of the symptoms of a lack of long range and systematic program planning.

One of the benefactors of the recently increased interest in marine affairs is ocean engineering. This is linked to a greater dependence upon offshore oil and other offshore facilities and the need for more knowledge of shoreline processes which accompanies coastal zone management. In the application of theory and scientific knowledge to the real marine world, ocean engineering becomes an integral and vital part of any problem-solving-oriented program such as Sea Grant. At least one ocean engineer advocates more interaction in Sea Grant programs, feeling that ocean engineering has not been accomplishing as much as it should within Sea Grant.³¹

The many areas in which Sea Grant operate have many organizations and agencies looking after them. Each of these groups has vested interests and does not like to give up any of its jurisdiction or cognizance. There are many Federal agencies carrying out marine programs of one sort or another:

Office of Coastal Zone Management
National Science Foundation (NSF)
Research Applied for National Needs (RANN)

Office of Naval Research (ONR)
Smithsonian Institution
U.S. Coast Guard
Army Corps of Engineers
National Marine Fisheries Service
Economic Development Administration & Office of Economic
Opportunity
Environmental Protection Agency (EPA)
National Ocean Survey

In addition there are state agencies and private funding programs.

As if there were not enough marine oriented Federal agencies, the National Advisory Committee on Oceans and Atmosphere (NACOA) has recently recommended the establishment of a new "Institute for Engineering Research in the Oceans" (IERO) to report to the National Oceanic and Atmospheric Administration.³² IERO would work on and develop ocean engineering standards, fund good ideas to solve basic marine engineering problems, animate technical transfer and professional communications, etc. All of the proposed functions are within the purview of Sea Grant, or could be accomodated by other Federal agencies.

The Ford Foundation has sponsored several marine programs with special emphasis on interdisciplinary work.³³ It is doubtful that these programs were coordinated with Sea Grant efforts, although they may have yielded worthwhile results.

The Office of Economic Opportunity provided funds for a Lumni Indian Aquaculture Project which paid for dikes, ponds, and a feasibility study. And then the Economic Development

Administration provided \$1.5 million for a 750 acre commercial production aquafarm.³⁴

The National Marine Fisheries Service of NOAA spends over \$2 million annually on "identified extension activities" including advisory services for marketing (wholesale and retail) and processing, as well as fishing.³⁵

The Corps of Engineers and Sea Grant carry out similar programs. Sea Grant and the Coast Guard have activities in common. EPA has overlapping projects. Sea Grant funds programs in areas under the cognizance of all of the agencies previously listed. There has to be wasted effort in there someplace.

It was the intent of Congress (at least in word) that there should be no duplication of effort among Federal agencies. Paragraph (f) of section 204 states - "In carrying out its functions under this title, the Foundation shall attempt to support programs in such a manner as to supplement and not duplicate or overlap any existing and related Government activities." With the words 'shall attempt', Congress indicated that the task might be unduly difficult.

Because the Office of Sea Grant has a small staff and because Sea Grant management is so decentralized, coordination with other Federal programs is limited. There is some communication, however, with joint funding of some projects and an exchange of reviewers with certain other agencies.³⁶

With the situation as it is, an overlap of effort is unavoidable. When a conflict is discovered, the Sea Grant System seems to be unconcerned. A significant number of projects are initiated with the knowledge that another Federal agency has responsibility for the activity in question. The defense frequently used in this situation is that the other agency wasn't doing a very good job or that the Sea Grant project could do it better. While these arguments may be true, there is some question as to whether the applied solution was the proper solution to the problem.

With so many other agencies operating marine oriented programs, what does Sea Grant have different to offer? What quality does it possess to justify its existence? Sea Grant cannot claim to be a worker of miracles. Sea Grant cannot even claim to be most efficient in unlocking the "untapped asset of immense potential significance". Nor can Sea Grant really claim to be unique in any one aspect. But the program is different enough in enough right ways to be useful in some things. It certainly has the potential.

Dr. McLellan of the Office of Sea Grant described their program as being unique in its partnership with the universities and its matching funds.³⁷ An Office of Sea Grant planning document says - "The strength of the National Sea Grant Program lies in the mutually reinforcing regional and national benefits that accrue as a result of these interactive partnerships."³⁸ The benefit as they see it is derived from a number of similar regionally managed programs, all with the same goals,

and the combination of their results on a national level which in turn would be distributed back to each region - with a synergistic effect.

The Program encourages the academic institutions to involve state and local governments, other institutions, and industry. As a result perhaps of this grass roots orientation, state people tend to see Sea Grant on their level. A Delaware planner visualized the university and the state as an R&D team to solve such problems as environmental impact statements, wetland evaluation, and marine resource development. He also sees Sea Grant as being independent of the state, involved in baseline studies, scientist training, public awareness, etc.³⁹ The Governor of Wisconsin in his welcoming address to the Fourth National Sea Grant Conference described the states as having the problems and the responsibility but others as having the power and resources.⁴⁰ The states see Sea Grant as something for them.

Sea Grant is designed to apply the systems approach to marine oriented problems. Multi-disciplinary teams will develop solutions to cover all aspects of a problem situation, beginning to end. The functions of education, research and development, and advisory services allow Sea Grant to fulfill this strategy.

The difference in Sea Grant seems to be in the organizational structure and the theoretical operation. With adequate funding

and efficient management, the formula should give a high probability for success.

Management

Good management is needed for the efficient operation of any program. The bigger and more complex the program, the greater the need for management. An efficiently managed program gives the appearance of being well-ordered and possessing direction and purpose. The Sea Grant Program is large and diverse. How effective has its management been?

Evaluations of a program by two people - one within the program, one outside - are very likely to be different. Although the insider has a greater working knowledge of the program, he is apt to have a distorted perspective. E.W. Seabrook Hull, speaking at the Sixth National Sea Grant Conference on the outsiders view of Sea Grant, described it as " an ill-defined Federal spending program with a potential for growth which has no discernable limit."⁴¹ He later says - "Sea Grant is an agglomeration of multiple, separate, often-duplicative efforts; it is a collection of individual spending cells that lacks cohesiveness and sense of specific purpose - and the main product of which is paper . . ."⁴²

Indeed, if you look at a list of Sea Grant publications, you are at first impressed by the huge number of them. Running down the list of project titles, even within a given subject listing, you are hard pressed to see a relationship

between them. The projects appear to be fragmented and you are left wondering if somewhere there is a master plan into which all of the individual projects fit.

This impression of extreme disorganization may or may not be true (or relevant), but impressions are often important, especially in political situations. In the case of Sea Grant, the outsider impressions have been somewhat backed up by some of those people more closely involved with the program.

Under the Act, the Sea Grant Program's administration was originally entrusted to the National Science Foundation which was already operating its own funding program. The NSF program was a passive program geared to passing judgement on proposals submitted by researchers looking for money for their pet project. So the Sea Grant Program began "as a broad, almost open-ended program".⁴³ The universities were encouraged by NSF to establish their own priorities in marine related research and development. The Sea Grant Program was thereby launched with a policy of decentralized management. It is the view of David Potter "that the administration of the Sea Grant college program requires significant departure from the present NSF philosophy in order to be successful".⁴⁴

It is likely that Congress did not fully understand the magnitude of effort that would be required to achieve the benefits which they envisioned in the flowery language of the 1966 Act. Inasmuch, they would not have foreseen the need for

strong management and so not included provisions for that management. Judy Kildow has stated that "...the national Sea Grant program does not really have the kind of authority to carry ou the kind of national program that we all know is necessary".⁴⁵

For whatever reasons, the management role passed to the universities. Unfortunately, those institutions have generally not been willing to or capable of managing a coordinated long range interdisciplinary program, especially on any scale larger than the university itself. One of the reasons is with a conflict in traditional university philosophy. Jack Davidson remarked at the Fourth National Sea Grant Conference that - "There appears to be a need for a stronger concept of management than is normally recognized as desirable by the academic establishment."⁴⁶ He recommends a path between the extremes of the free license of academia and the narrow limits of industry.

Another limiting factor to a strong university management is the normally very limited staff time available for Sea Grant program planning. But if each university had an adequate Sea Grant staff to mount a management effort, the result would be a tremendous waste in duplication of effort.

One of the distinguishing traits of Sea Grant is its multidisciplinary approach to marine related problems. This involves a number of disciplines working in a coordinated fashion to contribute to the common solution. However, it

is clear that the human factor enters and often results in disciplines having a resistance to giving up their individual purity - and in many cases there is conflict between disciplines. In the absence of strong central management, the disciplines do things in a manner comfortable to themselves, and when this happens, there is a breakdown in the working philosophy of Sea Grant. Its value is lost.

Seabrook Hull calls for "multi-institutional, multi-disciplinary management", but he thinks that perhaps the Council of Sea Grant Directors or the Sea Grant Association, rather than the national office, should have the responsibility.⁴⁷ While perhaps the groups he suggested could make general policy decisions, the real management would require a full time staff and therefore be better located in the Office of Sea Grant.

The Sea Grant Program has enough projects in enough different areas to be in need of a strong unification program. Ongoing, past and future projects need to be coordinated so that each contributes toward the achievement of some specified goal or goals. In an address to the 4th National Sea Grant Conference, Robert White said that there were 45 different projects in aquaculture, and then asked the question - how do they relate?⁴⁸ It is of critical importance to ensure that Sea Grant projects are not fragmented if the Program is to remain viable.

Most of the coordination that has been done in the past

has been through personal contacts between individual Sea Grant researchers, as has been done with the 200-mile economic zone management scheme that the University of Rhode Island and Oregon State University have been working on.⁴⁹ This method of coordination is fine as far as it goes, but can only be described as haphazard.

In the past, the Office of Sea Grant has taken a limited coordinating role because of a small staff.⁵⁰ As the Program is evolving, their coordinating role is growing, and they have indicated that there is a need for workshops within the individual areas of research to promote and plan coordination.⁵¹ At the 5th National Sea Grant Conference, Harold L. Goodwin announced seven areas where unification activities would take place, subject to Sea Grant budget: 1) Seafood processing waste utilization, 2) Ciguatera, 3) Aquaculture, 4) Lobster culture, 5) Small boat fisheries, 6) Technician training, 7) Modeling activities.⁵²

An integral part of any management is a set of program goals and policy formulations. Without these, the program lacks direction and some sense of security for those who must deal with the program. During the formative years of Sea Grant, goals and objectives were broad and sweeping. By the Fifth National Sea Grant Conference, Administration documents gave three objectives for Sea Grant: 1) Accelerate training and education of specialized manpower - ocean engineers and

technicians - for industry and government, 2) Carry out applied research for the recovery and use of marine resources, and 3) Distribute knowledge and information.⁵³ These are still too general to be used on a practical planning basis.

Certain administrative tasks become very difficult without stated objectives. "Only when national goals of the Sea Grant program are clearly defined is it possible to discuss more than a general approach to measurement techniques."⁵⁴ Without some means to objectively measure the success of a program (or even a clear idea of what it is trying to accomplish), it is hard to compete for limited funds.

Because the scope of Sea Grant is so large, it contains conflicting objectives - in the case of exclusive uses of resources is the resource development versus environmental preservation issue. "To supply information which allows for the increased utilization of shoreland areas is often in direct conflict with attempts to preserve such areas as viable natural systems. Since the maintenance of a 'neutral' stand on natural resources policy is paramount to ignoring this conflict, a clear definition of policy becomes necessary."⁵⁵ Policy decisions must be made if Sea Grant is to maintain a responsible program.

Time is an important variable which has not been given enough attention in the past management of the Sea Grant Program. Allocation of funds is heavily dependent upon

program time frames, and those time frames have been misjudged. Results are taking longer to achieve than anticipated, partly because the universities are not competent in programmatic research.⁵⁶ Had the extent of the long-term effort required to reach goals been realized in the early stages of Sea Grant, perhaps stronger management would have been instituted. David Potter noted that - "The now evident incredible mistake of assuming success in five and ten year time frames is appalling."⁵⁷

Perhaps the primary issue concerning the management of the Sea Grant Program is the question of who will be primarily responsible for management - the Office of Sea Grant or the individual institution. The Office of Sea Grant in the past has maintained that the universities should manage their own programs and establish their own goals and objectives. One reason for this is to protect Sea Grant institutional Directors' flexibility and quick reaction capabilities.⁵⁸ Another reason is to get university faculty and graduate students involved, who have no allegiance to the Federal government, to ensure independence.⁵⁹

A large university is capable of reacting quickly to good ideas - as scientists' and academicians' livelihoods depend on it.⁶⁰ Many scientists and researchers would resent centralized management, probably because it detracts from their independence, but could live with more generalized administrative coordinating efforts.⁶¹ This desire to maintain independence on the part of

scientists is probably due to the nature of their profession - they make their reputation and living from their ideas. Their resistance to the sharing of their ideas in the research stage of a project works against the idea of an interdisciplinary team approach.

Although the advantages for some decentralized management are real, it seems that the level of centralized management could be increased in such a manner so as not to lose those advantages.

The amount of effort going into one portion of a program is proportional to the level of funding that portion of the program receives. The Office of Sea Grant has given a high priority to raising the level of competence in marine related fields in a great number of institutions around the country. To do this has meant to spread the available funds thinly. Judy Kildow believes the funding has been too low to carry out a coordinated national program - "This low-level funding has also kept projects small, resulting often in fragmented efforts."⁶² George Pigott attributed a program loss of effectiveness to - " 1) late allocation of funds and 2) dilution of available funding in trying to please the myriad of organizations that desire participation."⁶³

Since the Sea Grant Program is funded jointly by the Federal and state governments, it is necessary to consider state needs when making management decisions. Regional goals

and objectives must be determined and benefits accrued by the states when evaluating regional programs. Of course the situation varies considerably from state to state.

Recent Office of Sea Grant Planning

The national office has just completed a planning document for the period of fiscal year 1975 through fiscal year 1979. This document sets forth management and program goals and objectives.

The eleven management goals reflect the management philosophy of the Office of Sea Grant.

1. To build and strengthen the partnership between the Office of Sea Grant and the participating institutions which together comprise the Sea Grant System.
2. To expand the Sea Grant System by developing strong, viable and adequately funded programs to serve all of the thirty coastal states and island territories.
3. To institute long-range program planning requirements for institutions of the Sea Grant System and to utilize program planning inputs for integration into future planning of the National Sea Grant Program.
4. To improve continuing communications and cooperation between the member institutions of the Sea Grant System and the various sectors of the marine community, including other educational institutions, industry, other private sector organizations and agencies of local, state and federal governments, for the purpose of stimulating coordinated and joint participation program efforts.
5. To improve the ability of institutions of the Sea Grant System to complement and extend their capabilities by

! coordination of related activities among the institutions of the Sea Grant System and through cooperative interinstitutional project activities arranged as a part of an institutional program or in concert with other Sea Grant institutions.

6. To stimulate and support timely and innovative projects of limited duration that have high promise of contributing to the solution of emergent regional or national problems or to the advancement of Sea Grant concepts internationally.

7. To maintain throughout the Sea Grant System effective communications with various user communities and the general public in order to transfer information about, and stimulate utilization of, Sea Grant products and services; and to obtain inputs concerning needs and opportunities to guide Sea Grant program planning.

8. To expand and broaden the specialist capabilities of the staff of the Office of Sea Grant so as to serve the institutions of the Sea Grant System more effectively in the planning, coordination and direction of national program activities.

9. To provide for more active representation of the Office of Sea Grant in the administrative planning and development processes within the National Oceanic and Atmospheric Administration.

10. To improve the efficiency and effectiveness of the proposal submission, review and award process and to minimize administrative reporting requirements so as to reduce the financial and time burdens upon both the Office of Sea Grant and the institutions of the Sea Grant System.

11. To develop criteria for the evaluation of Sea Grant research results including measures for the application

of these results in both public and private sectors.⁶⁴

Each management goal has several objectives listed beneath it (omitted above). The goals and objectives taken together do not represent a significant departure from past management philosophy, but will refine practices and improve on some problem areas, if they are fully implemented. They are steps in the right direction.

The program goals and objectives are multi-tiered and numerous, and are broken down into four broad categories, each having a general goal:

I. Marine Resources Development - To assess and assist in the development and optimal utilization of living, mineral and recreational marine resources for the public good and advancement of new and existing marine business and industries in a manner consistent with sound conservation and environmental protection practices.

II. Social, Economic and Legal Studies - To identify and provide useful inputs through research on those social, humanistic and economic factors relating to activities of man in the marine and coastal environments; and on the legal alternatives and institutional arrangements for effective decision-making and management of marine resources.

III. Marine Technology Research and Development - To expand the research and development base for the application of technology to problems of marine resources development and utilization; marine transportation; activities of man on and in the sea; and in the conservation of the marine and coastal environments.

IV. Marine Environmental Research - To develop data and concepts

essential to understanding the effects and consequences of natural events and human activities on the coastal and marine environments; to develop methods for alleviating environmental degradation and maintaining the quality of the environment; and to assist those concerned with coastal zone management through the interpretation and adaptation of appropriate environmental data and methods to the management process.⁶⁵

The program goals and objectives are written in general terms and designed to guide the institutions, who will continue to design their own programs.

Tomorrow and Beyond

Many of the problems discussed in this paper have been recognized by people responsible for the Sea Grant Program. As the Program has matured, measures have been taken to facilitate the accomplishment of the goals set down by those who first created Sea Grant. The functions of education and advisory services are most efficiently managed on a regional basis, as they are now. Due to the complexity of the problems addressed by the researchers in Sea Grant, and the traditional philosophy of research held by a great portion of academia, management of research at the university level may not be the most efficient means of accomplishing Sea Grant research objectives. A stronger management and coordination effort is needed.

All of this may be immaterial, however, due to the economy and the Ford Administration's desire to slash the

Federal budget in 'non-essential' areas. The Office of Management and Budget is currently questioning the existence of Sea Grant in its present form.

NOAA is now asking some basic questions about Sea Grant:

Is Sea Grant doing things that could be done better by mission agencies (NOAA, U.S. Geological Survey, U.S. Environmental Protection Agency, etc.)? Should Sea Grant be a seed money operation rather than (as now conceived) a long-term funding program? And, should Sea Grant be a stimulus to private industry or a subsidy? If a certain percentage of Sea Grant funds goes to coastal zone management, why shouldn't the Office of Coastal Zone Management at NOAA have the funds and deal them out to Sea Grant programs if it wishes? If a percentage of Sea Grant money goes to fisheries, wouldn't it be better for those dollars to be sent to Sea Grant universities via NOAA's Natl. Marine Fisheries Service?⁶⁶

While the Sea Grant Program is not perfect in its execution, it is the opinion of this writer that it is a great deal more worthwhile and productive than certain other activities stressed by the present Administration. Sea Grant certainly has great potential, and if given enough time, would go far in the development and understanding of our marine resources.

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