

Proceedings of the Workshop
on the
National Estuarine Sanctuary Program

October 1979

The Georgia Conservancy

The Coastal Society



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PROCEEDINGS
of the
WORKSHOP ON THE NATIONAL ESTUARINE SANCTUARY PROGRAM

Jekyll Island, Georgia
October 8 - 12, 1979

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Proceedings Edited
by

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INTRODUCTION

Jeffrey Zinn¹

The Workshop on the National Estuarine Sanctuary Program was an outgrowth of discussions between the Federal Office of Coastal Zone Management and The Coastal Society about future options for this Federal-State cooperative program for scientific research and education. The Federal Office was concerned that many problems were occurring repeatedly as each new sanctuary was established and began to operate. These included hostility from elements of the local community, lack of adequate funding, and problems attracting researchers and related support. The Federal Office also sought a forum where innovative ways to implement research and educational opportunities that supported more effective coastal zone management programs could be discussed. The Society wanted to bring together the widest possible range of interests that are potential beneficiaries of the sanctuary program. As a result of these discussions, The Society was asked to convene the Workshop for four purposes:

- 1) to identify problems which have faced or still face the program,
- 2) to develop potential solutions to the problems identified,
- 3) to provide increased communication between sanctuary managers and users, and
- 4) to articulate future directions for the program.

The Georgia Conservancy agreed to host and coordinate the Workshop. Invitations to the Workshop were limited to encourage an informal exchange of ideas and experiences. Invited participants included managers and staff of the seven sanctuaries (meeting together for the first time), representatives of Federal and State agencies, and experts on estuarine research and education. Some of the invitees were asked to prepare materials to stimulate discussion. These materials were distributed to registrants in advance of the Workshop. A number of scientists attending the concurrent biennial meeting of the Estuarine Research Federation also participated in the Workshop. They commented about research problems and opportunities in the context of the Sanctuary program.

The evening before the Workshop began, representatives of the seven sanctuaries, designated at that time, made presentations of their sites and activities at the Estuarine Research Federation Conference poster session. The next morning, the first presentation was a challenge to the Workshop issued by James Walsh, Deputy Administrator of the National Oceanic and Atmospheric Administration. During the remainder of the Workshop, four sessions were held to discuss establishing sanctuaries, research in sanctuaries, educational opportunities in sanctuaries, and future program directions. A site visit to one sanctuary, Sapelo Island, was also held. Each session started with several short presentations. After a period of discussion, all in attendance were asked to write down their interpretations of most important points. After additional discussion, everyone turned in their papers, altering them if they wished. This process generated several lively exchanges, especially during the discussion of

¹These remarks were drafted soon after the Workshop occurred; they have been substantially revised to reflect conditions as of May 1982.

opportunities for research in sanctuaries. The recorders summarized the session presentations and the written submittals. The Workshop ended with a consensus-building session, based on summaries presented by the recorders.

This was not the first Workshop designed to discuss the Estuarine Sanctuary Program. The National Oceanic and Atmospheric Administration had convened a Workshop in 1973 to discuss options for implementing new estuarine and marine sanctuary management responsibilities. Criteria for selecting sites and for protecting designated areas had received extensive attention. Many of the ideas discussed at the earlier Workshop were subsequently incorporated into the regulations or operational policies of the Estuarine Sanctuary program.

Since the 1979 Workshop, the Program has flourished with five additional sanctuaries being designated. New sites include Padilla Bay (Washington), Narragansett Bay (Rhode Island), Jobos Bay (Puerto Rico, Tijuana River (California), and Chesapeake Bay (Maryland). Congress reviewed the overall Federal coastal management effort in considerable detail in 1979, then reauthorized it for five years in the Coastal Zone Management Improvement Act of 1980. The estuarine sanctuary provisions were amended in four ways, the most important being increasing the authorized funding level from \$2 million to \$3 million.

At the same time, new federal constraints to this program have appeared. The Reagan Administration is attempting to phase out the Federal Coastal Zone Management effort, citing successful attainment of programmatic goals envisioned in 1972 and the ability of states to maintain their programs. To implement this goal, the Administration has sought to end the coastal state management grants program. This has resulted in states having increasing difficulty in participating in coastal zone management, including the sanctuaries program. The Administration's actions are also part of a broader Federal effort to reduce the budget which in turn constrains states in all aspects of natural resource management and protection.

Although these Proceedings were not available during this period of rapid change, papers presented and interactions at the Workshop have provided a valuable resource for discussions about the program. Hans Neuhauser used information from the workshop in testifying strongly in favor of the Estuarine Sanctuary Program before the House Committee on Merchant Marine and Fisheries, Subcommittee on Oceanography, on October 31, 1979. A conceptual paper on future opportunities for the program was prepared by Neuhauser and Jeffrey Zinn and presented at Coastal Zone 80 in Florida. Other actions are also underway.

Some important conclusions that we synthesized from these sessions are provided here. Some have been implemented, others are unlikely to be implemented because of lack of funds or other constraints, and others could be implemented with policy or program changes by the Federal office. This list of suggestions should provide a number of useful discussion topics the next time the sanctuary managers meet (presently scheduled for the Fall of 1982).

Our conclusions and recommendations fall into four categories. These are:

- 1) starting a sanctuary

- 2) operating a sanctuary,
- 3) the future role of the Federal Office of Coastal Zone Management, and
- 4) funding concerns.

Under each category, specific recommendations are underlined. Explanations are brief; most of these issues are discussed in some detail in the Proceedings. We hope that these recommendations will lead to program changes where possible and provide some guidance in future discussions about program needs and directions. Some can be implemented easily and at no cost; others describe an ideal that probably cannot be achieved because of external constraints and the past history of this evolving program. However, an appraisal of these conclusions should lead to a better understanding of where the program is headed and how the Federal Office can best deal with that future.

STARTING A SANCTUARY - No two sanctuaries followed identical paths in their establishment. However, some common lessons became apparent during the Workshop. First, develop a local constituency early in the establishment process. The effort should attempt to involve the maximum number of citizens, both friends and foes alike. In many cases, established local organizations that do not represent specific interests, such as the League of Women Voters, can be helpful.

One of the best ways to ensure that this recommendation is implemented is to hire the sanctuary manager early in the site selection process to provide continuity and a focus for activities. Start-up activities have been more difficult when several state agencies, with differing objectives, have been partners in the establishment process. We also note a related problem sanctuary programs have generally been placed at a low level within the state's structure. This problem can be partially overcome if the sanctuary manager works aggressively with other state agencies that are involved in research, education or protection of natural resources.

In designating a sanctuary, sites with an established research record that meet other requirements should receive priority consideration. Sanctuaries with an established record have started programs more rapidly because funding was easier to attract, facilities were already in place, and the site has a data record. Established research interests at Apalachicola, Sapelo Island, and Elkhorn Slough were strong constituencies supporting the sanctuary concept. If the sanctuary is not within easy driving distance of research labs, or does not have overnight and lab facilities, researchers will need other incentives. To overcome this possible limitation, each sanctuary proposal should include a clear statement on the siting and intended uses of a sanctuary headquarters facility. Without such a statement, uncertainty about the State's intention may detract from development of the sanctuary.

States and the Federal Office should consider use of easements to supplement acquisition programs. Acquisition maximizes the amount of money required and minimizes the size of the area to be protected. In some cases, alternatives to acquisition may protect larger areas to a satisfactory degree at less costs. States should be encouraged to explore these options.

OPERATING A SANCTUARY - After a sanctuary is established, public attention and interest generally die down. Programs at each sanctuary should be highly visible. Continued success requires a constant attention to

building and maintaining community support. One way to do this is to tie research and education programs to the interest of the local community whenever possible. Whenever research results can contribute to local knowledge, better use of resources or the local economy, it should be publicized. Demonstrating the value of the sanctuary helps ensure a continuing broad base of local support.

Interest at the state or national level should also be maintained. A good vehicle is to widely distribute results of sanctuary research. The sanctuary staff could use a number of forms to distribute this information, including hosting scientific gatherings, publicizing projects and results. At the state level, integration of the activities of the research and education programs at sanctuaries into state coastal programs needs to be improved. It was interesting to note that the sanctuary program and the coastal program are seldom in the same state agency. Mechanisms to encourage close cooperation and mutual support, such as participation by the state coastal management agencies on an interagency sanctuary management board, are needed. The Federal Office of Coastal Zone Management, as part of their state program review, should examine and comment on the degree of integration between the sanctuary and the state program.

Conflicts among different legitimate sanctuary uses are likely. When such conflicts arise, highest priority should be given to long-term research projects, and all research projects should have priority over educational activities. Long-term research projects have the greatest likelihood for providing the unique benefits for which the sanctuary system was created. Further, these projects have few alternative sites where natural conditions can be guaranteed over the life of the research activity. By contrast, education programs have great site flexibility and can be conducted at small designated areas at the sanctuary or at other sites. The Federal Office of Coastal Zone Management should clearly articulate the national interest priorities in use of sanctuaries.

FUTURE ROLE OF THE FEDERAL OFFICE OF COASTAL ZONE MANAGEMENT - The continued success of the sanctuary program requires that the Federal Office assume a number of altered or new responsibilities. A number of the managers indicated that their sanctuaries were generally operating well, but that some additional assistance would considerably improve the operation. A common suggestion was that the Federal Office should prepare, distribute, and periodically update a booklet on common experiences of establishing sanctuaries, including ways to express the economic benefits of a sanctuary designation. Such a booklet would assist states in developing sanctuary proposals and selling the sanctuary concept. It should emphasize that the sanctuary program is not a land preservation effort; sanctuaries have two active uses, research and education, which require a degree of site protection to maintain their long-term value. We heard that many states go through many of the same problems in establishing sanctuaries, including institutional squabbles, the lack of a sanctuary constituency and local hostility. Some proposed sites have not been approved because of these problems.

The Federal Office should also create mechanisms to encourage inter-sanctuary communication. A newsletter is certainly one possibility. The other is periodic meetings of sanctuary managers and staff. Both these ideas have been implemented with a trial newsletter in 1980 and the next

manager's meeting, proposed for September, 1982. The newsletter will become more important as the number of sanctuaries grows and individual sanctuaries gain in operational experience. The newsletter should be reinitiated and coordinated by the Federal Office.

To date the Federal Office has been concerned with establishing sanctuaries - now it must become more involved in operating a sanctuary system. The expertise and organization of the Federal Office is aimed at establishing sanctuaries, an activity at which they have been most successful. But that success has generated a need for new staff capabilities and new programmatic directions that emphasize intersanctuary and interagency communication. One area the Federal Office could be of great assistance in is publicizing the program within the federal community of research and natural resource management agencies. Attracting federal research funds to sanctuaries has been limited, in part, because many federal agencies appear to be unaware of the potential of these sites to contribute to their programs.

In seeking federal research funds, the Federal Office should emphasize that the sanctuary system should provide for coordinated monitoring of the principal coastal ecosystem types of the nation. There is virtually no coordination of education or research programs among the sanctuaries. The Federal Office should encourage coordination. The sanctuary system could contribute to national programs that measure changing environmental conditions. The sanctuary system provides a unique opportunity to coordinate national research on coastal ecosystems with different characteristics - this fact should be emphasized. Such emphasis may give individual sanctuaries additional leverage to attract scarce research funds. In emphasizing the national system concept, the Federal Office might want to add a criteria when reviewing sanctuary proposals - how will the proposed site contribute to a national system?

Given the success of the program, a number of future alternatives to complete the system should be examined. A range of alternatives have been suggested, from one sanctuary in each of the 18 to 22 biogeographic provinces and subregions to perhaps 150 sites where resource protection has been identified as desirable, and the sanctuary concept would provide a useful mechanism. These and other options need to be discussed.

FUNDING - Funding, a constraint mentioned frequently at the Workshop, has become even more of a concern since the meeting in established sanctuaries and proposed sanctuaries. There are several strong reasons to increase funding although, given present federal funding limitations, it does not seem particularly useful to recommend increased funding as a blanket solution to many problems. One topic the Federal Office should debate is whether fewer sanctuaries should receive more funding or a larger number of areas should receive relatively less funding per area. David Klarer, from Old Woman Creek Sanctuary stated that the typical sanctuary is "land rich and money poor".

The pre-acquisition grant should be awarded earlier in the planning process and its size should be increased. The selection process has varied from state to state. In some locations, \$50,000 is more than enough to fund the variety of required pre-acquisition activities, but in others it has been insufficient. The result has been that the selection process has sometimes appeared to be justification for a selected site rather than a

process of selection among alternatives. If this grant, whatever the size, were awarded earlier, it could help defray the costs of identifying alternative sites, public participation, and site selection. Under present regulations, these funds are only available after a site has been selected. If many sites are being considered, the selection process itself can be very expensive.

The continued success of the sanctuary program will depend on securing funding beyond the annual federal operational grants of up to \$50,000. Many of the participants were concerned with the pattern of funding for various purposes - too much for some and too little for others. The sanctuaries need an active program to locate other sources of funds that will improve their program flexibility and survivability. It is most important that their financial independence from the Federal Office be established during the time that they receive federal operational grants.

Finally, sanctuaries have had a particularly difficult time locating research funds. Most of the sanctuary managers seemed to agree that with money, they could attract research programs. Money not only includes direct support, but also other tangibles, such as room and board, and on-site research laboratory facilities. Each new sanctuary that has no research record must discover possible sources of funding. The Federal Office should provide assistance to new sanctuaries on locating possible sources of funding for research.

The Workshop had value beyond the information and ideas presented in the pages of these Proceedings. The sanctuary managers were able to exchange ideas and to meet with citizens, scientists and others who have been actively involved in the program. These acquaintances will encourage continuing communication among those interested in the program, and in an ongoing exchange of ideas. As with many small Workshops, the Proceedings left a number of questions unanswered, but many of these questions were clarified, so subsequent meetings will have a better opportunity to resolve them. The Coastal Society and The Georgia Conservancy believe that publication of these Proceedings will contribute to that exchange and also reach a larger community that is interested in the program.

ACKNOWLEDGEMENTS

The Workshop on the National Estuarine Sanctuary Program was conceived by Dr. Ted LaRoe when he was president of The Coastal Society. While the program was our responsibility, we are indebted to Dr. LaRoe and a number of other people for their assistance in developing the content. Foremost among them is Jim MacFarland, manager of the Estuarine Sanctuary Program at the Federal Office of Coastal Zone Management (OCZM). Patti Snow, an intern with OCZM helped coordinate workshop logistics. Jenny Phillips with the Georgia Department of Natural Resources and Dr. Donald Kinsey of the University

of Georgia Marine Institute insured the success of our field trip to the Sapelo Island National Estuarine Sanctuary. Dr. Robert J. Reimold and Dr. Mike Castagna of the National Estuarine Research Federation provided key support in the linkage of the Workshop with their concurrent Estuarine Research Conference.

Preparation of the Proceedings was ably assisted by the four Workshop session recorders, Frank Christhilf, Rich Weinstein, Carroll Curtis, and Jim MacFarland, all from OCZM. They pulled together large amounts of information in a short time, contributing greatly to the success of the summary workshop session. Drafts of the manuscript were reviewed by Brian Sullivan and Ann Freud. Annie Littlejohn, Loan Tran and Becky Shortland typed the manuscript.

We would also like to thank everyone who attended and contributed to the workshop. Their interaction at the formal sessions and informal conversations led to a number of important consensus statements on the present operation of the sanctuary program and possible future improvements. This interaction was also facilitated by the seafood supplied by several Sanctuaries, which reenforced everyone's desire to protect the resources of these areas.

Hans Neuhauser

Jeffrey Zinn

SPONSORING ORGANIZATIONS

THE COASTAL SOCIETY
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Bethesda, Maryland 20814

The Coastal Society is a nonprofit international organization dedicated to promoting the understanding and wise use of coastal environments. Through the media of conferences, workshops and publications, The Society seeks: (1) to foster improved interdisciplinary cooperation and communication among professionals (such as marine scientists, coastal engineers, lawyers, coastal zone managers, government officials and students), as well as public interest groups and private citizens concerned with coastal environments; (2) to improve effectiveness in the promotion of the wise use of coastal resources, consistent with the dynamic natural processes of coastal environments; and (3) to further public understanding and appreciation of the need for scientific knowledge, for clear policies and laws, and for effective management programs to assure the balanced development and protection of coastal environments.

THE GEORGIA CONSERVANCY
4405 Paulsen Street
Savannah, Georgia 31405

The Georgia Conservancy seeks to protect and enhance the quality of Georgia's environment and to encourage wise use of the state's natural resources. In achieving

these goals the organization also works towards finding a balance between the needs of the state's economy, the social and cultural needs of its people, as well as the needs of natural systems in order to maintain their vital functions. Education and advocacy are the basic tools of The Georgia Conservancy. The group first educates itself through research into all sides of the issues. The Board then seeks the most responsible and effective approach. Adopted policies and positions are carried out by volunteers and by a small professional staff. Advocacy methods include direct contact with decision-makers, statements at public hearings, programs in the news media, educational publications, seminars, field trips, luncheon meetings and others. Whenever possible, the Conservancy seeks to solve environmental problems by means of positive, cooperative programs rather than by adversarial confrontation. If necessary, the organization will litigate, but this step has seldom been required.

THE ESTUARINE SANCTUARY PROGRAM
FUTURE CHALLENGES

THE ESTUARINE SANCTUARY PROGRAM: FUTURE CHALLENGES

James P. Walsh¹

Today you will be discussing the National Estuarine Sanctuary Program. Whenever I think about the sanctuaries program I become confused and I think everyone else is similarly confused. And I always think of Quasimodo dragging his goodlooking girlfriend off to Notre Dame and yelling for sanctuary. A lot of people seem to conjure up the same image or at least they don't truly understand what is going on. So today I'm pleased to welcome you to this, the first of several national estuarine sanctuaries that we have at such lovely locations. I plan to come again and stay a bit longer.

I think these kinds of meetings generally provide a wealth of experience and ideas that go far beyond the usual printed program. The contacts and the ability to renew acquaintances and to exchange ideas after hours usually are extremely helpful. We hope this will also be a renewal of your enthusiasm for what we believe is a very quietly effective and successful Estuarine Sanctuary Program.

This morning I have been asked to talk of challenges facing the program. But before I do, I want to reaffirm our commitment: NOAA believes that the Estuarine Sanctuary Program is an indispensable part of our Coastal Zone Management Program. While it certainly does not attract the controversy and the publicity of its more visible partner, the Marine Sanctuary Program, we think that the Estuarine Program has steadily matured. It has provided a small and growing legacy that will be appreciated by our descendants. Accordingly, we will be seeking reauthorization of the program when we submit coastal zone management legislation to the Congress shortly. We are also extremely proud of the seven existing sanctuaries. These have very interesting names -- at Coos Bay, Oregon, the South Slough (I was born in Coos Bay and I know about the Slough -- it's a place where we used to like to throw beer cans about. I hope they've cleaned those up); Old Woman Creek Sanctuary in Ohio; Rookery Bay in Florida; Sapelo Island, not far away here in Georgia (which you will visit today); a place where I would love to go if I could stand the 8-hour hike in Hawaii, Waimanu Sanctuary; and most recently, Apalachicola and Elkhorn Slough. I've seen Elkhorn Slough and it's truly a magnificent place; I have not had the opportunity to see Apalachicola.

¹ Deputy Administrator, National Oceanic and Atmospheric Administration

Each one of these sanctuaries has added its own special character, its own flavor, to the program and this, I think, is both a reflection of the strength and a source of the success of the program. Each is evidence of local commitment the Estuarine Sanctuary Program. Each has its own special nature in the way it was created and in the way it fits into the program. And I think it is a salute to the value of the resources and a tribute to the need, and the recognition of the need, to understand estuaries and the processes that influence them.

These days, as many of you probably recognize, it is simply not enough to create another government program, to announce a number of very happily arrived upon federal goals; and to provide a pile of money. Programs in the federal government fill a book much larger than the Manhattan phonebook and are sometimes just as incomprehensible. It takes a good measure of local interest, local involvement, and local support to make a program viable. I think all of you here, judging from your variety of backgrounds, particularly at the grass roots level, represent the strength of this program. The strength is certainly not, in my opinion, the fact that we have a national program in Washington -- it is the fact that there is interest and involvement by all of you. Even though we haven't come very far in the eyes of many -- and we do have a long way to go -- I think we have moved progressively forward using some very novel and individualistic techniques to deal with the sanctuary program.

But we are also aware that it hasn't been very easy to get to the stage where we are today. I know many of you have probably spent more time than you would like dealing with problems you were never trained to deal with. And I do think that we ought to recognize and congratulate each of you for the part that you have played.

Surprisingly, in the public eye, it was not that long ago that what are now sanctuaries in marshes and wetlands in this country were treated as little more than unsightly, smelly breeders of mosquitoes and other creatures that crawl in the night. They were areas to be avoided and certainly were not appreciated except by a few experts who were well educated and who knew of their biological value. We are wiser now, or at least we are more knowledgeable about the apparent value of our estuaries. But -- as with many things which are not of solely monetary value -- the public did not recognize the work of these important biological systems until sometime after many of them were lost to development. About fifteen years ago, the so-called environmental movement brought the tragic loss of these vital areas to the public attention. In many states, the loss of wetlands preceded comprehensive coastal zone management programs and regulations by many years.

Upon reflection, we can say that we have many state and federal laws which are designed to protect these areas, including the Clean Water Act, the Coastal Zone Management Act, the National Environmental Policy Act, and one of the granddaddies, the Fish and Wildlife Coordination Act. Each is considered to be a very important tool for protecting estuarine ecosystems. Yet, though we may have all these statutory protections and strong, clear national policies and we may be "wiser" managers in some respects, the pressures of our society still threaten many remaining estuarine areas. We of NOAA, of course, have instituted

major new programs and have recently revitalized existing programs in the area of habitat protection and understanding the effects of marine pollution. Yates Barber, as some of you may know, is here today from our Office of Habitat Protection. This is a program which we feel is of growing importance in our National Marine Fisheries Service, although the problem is an old one. In Louisiana alone we estimate that over 10,000 acres of wetlands are lost each year. While the State of Louisiana is almost all wetland, we think losses of this scale may have a serious effect on other natural resources. Even Jacques Cousteau, who has long spoken of the death of the world and the sea by pollution, announced last week in South Carolina that it is the mechanical destruction of life-bearing areas of both the sea and the coast which is now his major worry.

Facing inflation, a large and perplexing government, growing energy costs, and -- as many call it -- a lack of public confidence, people of our nation show signs of letting the undesirable practices of pre-environmental days come back. We see the pressures grow more and more and, of course, are heavily involved in the fight to protect areas that are of public interest rather than the private economic interest. One of our challenges will be to prevent insensitive policies toward natural areas from making a comeback and costing us the progress that we have made. What this program offers is a continuing effort to make the public aware of the value and the need for estuaries, and continuing support of research to understand one of the most complex natural systems.

For these reasons and many others, we are strongly supporting President Carter's wetlands initiative. His efforts to focus greater interest on such areas are further supported by his recent announcement of support for a Year of the Coast. I think it is somewhat ironic that we have to resort to these kinds of techniques to reassert and refocus something that we should be wiser about already. There must be many other supporters who recognize the value of these areas. For example, the people of Corpus Christi, I can assure you, now will appreciate the value of their estuaries that have been threatened with pollution from the Campeche oil well blowout.

Clearly, the fishermen of this country should be our supporters. They should know that over three quarters of the income-producing fish which they catch depend on estuaries. And, although this will be debated in the hurricane danger zones along our coast after Hurricane David and Hurricane Frederick, people certainly should appreciate the protective value of estuaries and barrier islands. But, unfortunately, we can probably say that such messages are often lost in the onslaught of today's news. Therefore, the need for understanding estuaries and the need for dedicating and putting aside those that are of most value is critical. I think it would be dishonest to say that the National Estuarine Sanctuary Program can save the world and turn all the threats and destructive pressure around. But it plays an important part and will make a valuable contribution. Perhaps in the long run, the most valuable contribution will be to set aside extremely important areas that right now people tend to take for granted. One day, I think people will look back on the sanctuary program much as they gratefully look back to the policies of those millionaires who came down here to protect this area

only for themselves but, thereby provided for the future some marvelous barrier islands here in Georgia. Clearly, however, it is one thing to set geographic areas aside and quite another to achieve the goals set forth in the sanctuary program of research to understand ecological processes and public education.

Let me talk about these in turn. First, in the area of research, we agree that each and every estuarine sanctuary should have a well-established long-term estuarine research program involving multi-disciplinary scientific projects. We have given to you, the managers, the arduous dual tasks of setting up the sanctuaries (which gave you far more headaches than you ever expected) and managing them from day-to-day (which brings even more headaches and takes an enormous amount of your time. After all, most of you weren't trained in the English tradition to be a country squire, to be your own carpenter, bookkeeper and lawyer, legislative lobbyist, and public affairs officer). In addition to those tasks, we have asked you to establish good long-term research programs in the estuaries. There is no doubt that the federal government itself, in many areas, has great difficulty in setting up long-term research programs while protecting them from displacement by short-term needs. It will be equally difficult, if not more so, when you have to manage a number of other long-term research projects that got started before you arrived on the scene.

Also, I think that academic researchers will be very slow to associate themselves with an estuary, particularly if they are already well-established in other places. It is, of course, no surprise that research dollars in this area will be scarce. Last week, NOAA presented its budget request to the Office of Management and Budget (OMB) and we were then informed that the President desired a balanced budget option for 1981. Of course this is an election year budget. For those of you who don't follow the federal budget game, let me explain. Three quarters of the federal budget is not controlled by the Administration. It is already committed to payments that are required by law for such things as Social Security. That means that reducing spending to balance the budget can only be accomplished by cutting programs in the one-quarter of the budget which the Administration does control. These are programs such as those we manage at NOAA. Our budget is small relative to others, about \$800 million, but none-the-less, we are looked upon as an entity which can be cut in order to help achieve a balanced budget. To balance the 1981 budget will require a cutback of approximately \$29 billion. Therefore, the first question OMB will ask is, "what is the political payoff from spending money for this program?" Of course research programs are controllable, and, unfortunately, long-term research does not equate with good political payoffs.

Therefore, I think you will have to look to existing programs and you will have to turn to established investigators and research managers under such programs as the Sea Grant Program and the National Science Foundation, and convince them that estuarine sanctuaries are worthy of their attention. This will take time and considerable effort on your part.

Secondly, in developing this research, it is going to be difficult to make it "relevant" in the eyes of those who must give the funding. Put another way, it is simply not enough to state that the goals of your program are to study everything in the estuary. We cannot get away with that, and we certainly cannot afford it. Therefore, we have got to decide priorities about what really needs to be studied. What can be investigated in one estuary that will bring us information that might be applicable and usable in other estuaries?

In the same vein people talk about monitoring. One of the things that I have been doing for the last year and a half is chairing an inter-agency committee looking at marine pollution research in the federal government, including monitoring research. Some of the things that we got hung up on early and for a good period of time are the questions: "What is monitoring?" and "What do you monitor?" There are a number of answers to the questions depending on whom you ask. For example, the Environmental Protection Agency (EPA) has certain statutory responsibilities with regard to marine water quality and enforcement of regulations in that area. Their concept of monitoring is related to that immediate kind of activity. NOAA has a much broader scientific mandate and we want to monitor longer term, broader processes. So you can quickly see that people do not agree what a monitoring program ought to include, and certainly you can't monitor everything. You have to make a decision about priorities. Therefore, one of the challenges to you, if you decide to have a monitoring program, is to devise one that responds to local problems, but also contributes to a national network. In this regard, I would suggest that you look at EPA's Mussel Watch Program which may be of some use. In addition, those who manage the Mussel Watch Program may well be interested in adding an area such as an estuarine sanctuary because of its pristine natural condition.

Let me now turn to public education and awareness. I suspect that most of you who manage sanctuaries have discovered that once they are established, they are off the front page. And you may begin to wonder whether anybody remembers that they were ever created. This is particularly true if the designation of the sanctuary involved political issues or controversy over the value of the purchased areas or conflict with the fishermen or industry. That is front page news. Trouble makes the front page. You'll discover day-to-day that to get back to the front page will be nigh on impossible -- particularly if what you want to say is: "Estuaries support fisheries". That won't be front page news. Public education will take a lot more of your time. You will be afraid that you are not getting through to the right kind of people. It will be difficult to accomplish.

Let me conclude by saying that I don't worry about the problems associated with setting up the program. The experience that you all have had in setting up the existing programs and activities like this workshop to share ideas and develop different ways will all be beneficial. We will eventually see the time when it will be simpler to establish estuarine sanctuaries and we will begin to get rid of the red tape. But, I suspect that it is not going to be easy to achieve the real goal that has been set forth in the legislation -- that is to bring about

an understanding of what has happened and is happening, and then to translate that understanding into messages that can be grasped by people who don't have a college education and people who do not understand complex chemical formulas. I think that is the real challenge facing the program.

ESTABLISHING ESTUARINE SANCTUARIES

ESTABLISHING ESTUARINE SANCTUARIES -

SESSION SUMMARY

Frank Christhilf

The panel on establishing sanctuaries was moderated by Hans Neuhauser, Director of the Coastal Office, Georgia Conservancy. Panelists were Les Strnad, Coastal Planner, California Coastal Commission; Ted LaRoe, Past President, The Coastal Society; Rod Hennessey, Coordinator, Virginia Coast Reserve, The Nature Conservancy; and Steve Leitman, Environmental Specialist, Florida Department of Environmental Regulation.

Les Strnad made some personal observations on the public participation process, based on five year's experience working on the Elkhorn Slough Sanctuary. He stressed the need for "meaningful involvement of all interested parties", pointing out that States should not rely on federal guidelines to fulfill their obligations. In Strnad's view, States generally have had "less than a meaningful public participation program".

States must gain better local support before proposing an estuarine sanctuary site by overcoming several problems. First, the public is increasingly skeptical toward all government programs involving management and regulation. Second, the federal process for proposing a new sanctuary deals only with a "concept" until the State has actually selected a site. The local public is involved only at the end of the process after a site has been selected. These individuals and groups should be involved much earlier in the selection process. Further, the public does not know what a "sanctuary" is and does not understand the federal regulations. Thus, it is even more important to involve the public at the earliest possible time to minimize misunderstandings and maximize support.

An informed and cooperative public is essential if our resource management programs are to be effective in the future. The ultimate responsibility is the State's. Strnad gave two suggestions:

- 1) public participation should begin when the selection process is initiated; and
- 2) existing federal regulations should be changed to make funds for public participation available during pre-acquisition planning, when there are one or more candidate sites.

Perhaps we can not do more with less money, he said, but we can improve doing what we do with less waste and duplication. We need to

demonstrate that the sanctuaries of today will benefit all of us in the future, and that management and research techniques learned through the sanctuary program will bring economic benefits to the public.

Ted LaRoe, formerly involved with the sanctuary program at the state and federal levels, reviewed the history of the estuarine sanctuary concept. It started with the Stratton Commission Report (1969) that recommended the establishment of a representative system of undisturbed estuaries for long-term research and education. Each important term from this recommendation has changed in concept. The original definition of a "representative system" included both geographic and biological factors with a goal of 18 to 22 sanctuaries nation-wide. These sanctuaries were to be "relatively undisturbed" to the maximum extent possible as sites for future research and education. Focus on the ecosystem -- uplands, marshes, and water together -- was another distinguishing feature of the proposed Estuarine Sanctuary Program.

These were to be natural field laboratories for long-term educational and research use. They could serve educational and research roles supporting improved coastal zone management decisions. Sanctuaries were in some respects to be like "ecological reserves" as defined by the Federal Committee on Ecological Reserves.

Four problems have emerged since the first conference on estuarine and marine sanctuaries was held (1973) and the program regulations were published (1974).

- 1) State interest is lacking. In response to a questionnaire in 1974, 22 out of 34 States said they were interested in the Estuarine Sanctuary Program, but wanted to delay their involvement until after their state CZM programs were approved. About half of the States now have their coastal programs approved, so this is a good time for States to focus on the Estuarine Sanctuary Program.
- 2) Local opposition to proposed sites has been high. In five of the seven sanctuaries, severe local opposition has been a result of lack of public involvement in the early planning stages.
- 3) Funding for research in sanctuaries is not adequate.
- 4) Educational use of sanctuaries is minimal. When you look at the educational value of sanctuaries and their potential for improving public understanding, they are vastly underutilized, according to LaRoe.

Some of these problems are related to a lack of understanding of the purpose of the sanctuary program. The objectives are generally clearer now than several years ago, yet there still is a tendency to view sanctuaries as "refuges" in the old sense. Sanctuaries should not be seen primarily as tools for habitat protection. Too often, individuals start talking about the sanctuary program when they see a marsh that needs protection, not thinking about the goals of the program.

In closing, LaRoe raised additional questions that need to be examined. Is the program useful? Is it still needed? Are acquisition funds sufficient? How can research funds for sanctuaries be obtained? What role can the Office of Coastal Zone Management (OCZM) play in getting the National Science Foundation, Sea Grant, or the Environmental Protection Agency to direct some of their research funds into estuaries? Could the federal program affiliate with groups such as "Man in the Biosphere" for protection of wetlands and for research? Should OCZM coordinate a national search for sanctuary sites?

Rod Hennessey described The Nature Conservancy's program to protect the Virginia barrier islands. The Nature Conservancy (TNC) tries to protect existing examples of natural diversity using a "Noah's Ark approach", that is, selecting various examples of diversity nationwide and protecting them through a variety of means. TNC has about 2,000 projects around the country. One of these is the Virginia Coast Reserve, a series of barrier islands covering 35,000 acres extending 41 miles along the Delmarva peninsula. After acquiring these islands, TNC determined that a management plan was needed. The plan included four elements:

- 1) ecosystem description -- identifying existing knowledge, and those aspects of the environment that are most sensitive to man and able to be protected with management tools;
- 2) social and economic analysis -- studying how the islands were traditionally used and how people felt about removing such a large area of seaside real estate from the private marketplace;
- 3) legal resource manual -- a legislative compendium and title search of Coast Reserve holdings; and
- 4) stewardship volume -- a basic land management plan comparing the TNC proposal as stewards with the typical approaches and programs of public agencies that would like to control the islands.

The management plan resulted in several key decisions.

- 1) One early decision was to establish a mainland headquarters for the island preserve -- it was not appropriate to build on the islands -- to serve as an educational/interpretive center with meeting space, a research library, and other facilities.
- 2) Be aware that appreciation of natural areas varies inversely with the distance from the site. Local people were most concerned about the reserve, so a local advisory committee was formed that represents important local interests. TNC hopes this committee will help ameliorate some of the negative feeling toward the Coast Reserve.
- 3) Attempt to envelop the reserve with several layers of protection. Federal, state or local policies can change at anytime. For example. TNC enrolled the reserve as a National Landmark,

a designation offered by the Heritage Conservation and Recreation Service (HCRS). Hennessey suggested that all possible sources of protection should be considered, such as the Man in the Biosphere program, as well as having the area listed on local land use plans as "open space".

- 4) Form a constituency for on-going support. Hennessey organized the "Friends of the Virginia Coast Reserve", which has generated \$22,800 through 700 individual and family memberships. A newsletter is published periodically to keep members informed of research in the reserve and to solicit support for specific efforts.
- 5) Initiate efforts to raise a management endowment. TNC's endowment fund will make continuation of the program independent of the internal purse strings.

Steve Leitman discussed various approaches to evaluating the economic impact of estuarine sanctuaries. He derived most of his information while preparing the economic portion of the Draft Environmental Impact Statement (DEIS) for the Apalachicola River and Bay Estuarine Sanctuary.

Steve's basic approach was to look at the estuarine sanctuary as part of a larger system. The analysis was done at three scales:

- 1) effect of the sanctuary on local areas;
- 2) impact on entire river basin; and
- 3) effect on state and federal interests.

Local areas presented the most problems because the impact was most direct. The major local impacts of the sanctuary in Apalachicola were on the tax base and the fishing industry. The tax base tradeoffs were important to communicate to local officials. The Department of Environmental Regulation was able to show that if establishment of the sanctuary were to raise property values on St. George Island a mere 3 percent, this increase in land value would overcome the tax loss of land placed in public ownership. Some fishermen feared that they could no longer fish in the bay if the sanctuary were established. Extensive interaction was needed to convince the fishermen that rather than preclude their use of the bay for fishing, the sanctuary would benefit the fishing industry through preserving water quality and promoting research.

The second level of analysis -- the river basin -- presented a different set of problems. The Apalachicola River is used for many purposes. Some of the more important are commercial fishing, navigation, recreation, drinking water supply for Atlanta, hydro-power, and forestry. Most users were naturally suspicious of the sanctuary's impact on their interests. In the Apalachicola River basin, the chief problem was the navigation issue. Those who use the river for navigation want to "improve" the river by dredging and maintaining a channel and they were very distrustful that Florida would use the sanctuary to control navigation by limiting dredging. However, Steve's analysis indicated that

research conducted in the sanctuary might be an asset to navigation interests by improving communication and coordination among the three states in the basin, Georgia, Alabama, and Florida. The interstate interaction initiated through DEIS process showed this analysis to be correct.

At the state and federal levels, there should be no serious controversies since both the state and federal governments are working together to create this sanctuary.

Steve concluded by suggesting several research questions that need to be addressed in the area of economic analysis.

- 1) What have been the economic impacts of designation on property values adjacent to estuarine sanctuaries?
- 2) Has any significant changes occurred in the level of tourist activity since the establishment of the sanctuary?
- 3) How extensively have sanctuaries been used by schools and colleges for educational purposes?
- 4) Has the sanctuary caused any significant change in private and public uses of the natural resources within the sanctuary?
- 5) Has the sanctuary created any spin-off industries--such as tours through the sanctuary?

If we can get better economic data about changes when new sanctuaries are established or operating it will help people predict economic impacts of future estuarine sanctuaries.

At the conclusion of the presentations, questions were raised by members of the audience. One member asked whether it is possible to say that no prohibitions of fishing would occur within an estuarine sanctuary? LaRoe replied that in South Slough, Oregon, expansion of oyster culture and use of motorized vessels without a permit were prohibited. Someone added that local opponents to the Elkhorn Slough designation in California cited sanctuary restrictions in Oregon as "typical" government regulation. Potential restrictions of any kind need to be made known from the beginning.

A second person asked whether a precedent existed for having non-contiguous areas in a sanctuary? LaRoe replied that it would be in the best interest of the sanctuary concept to preserve one large area to withstand the external stress on the system, rather than several small ones.

Another question concerned effects of the sanctuary on adjacent upland areas. Strnad replied that the impact on land use surrounding the sanctuary had to be carefully analyzed and explained to property owners, and suggested that a "buffer zone" concept should be explored.

The final question was whether federal consistency was considered

an important factor in the area surrounding a sanctuary? LaRoe suggested that a careful selection process was the most important way to address this issue. Strnad added that if the state coastal management program is not implemented at the local level, it will be very difficult to deal with external stresses on the sanctuary.

Following the question and answer period, attendees were invited to write down their ideas about establishing sanctuaries and turn them in to the moderator. The following ideas were submitted.

- 1) Entire ecosystems, or as much as possible should be included in each sanctuary. Use less than fee-simple techniques and combine the new lands with other state and federal holdings to maximize protection of the sanctuary.
- 2) Seek additional designations such as a National Landmark, to assure protection.
- 3) Integrate the sanctuary into the local land use plan.
- 4) Plan a major workshop to acquire input from a variety of sources for defining the sanctuary area, such as was done in Apalachicola.
- 5) Define "sanctuary" better, or rename program to overcome its negative image.
- 6) Establish cooperative relationships with industry, property owners, and others to "protect" use of adjoining lands.
- 7) Build a "citizen's lobby" to assist States with the selection process. State commitment to the selection process is needed.
- 8) Clearly state in the guidelines that the sanctuary contains no regulations that will change or modify adjacent land use policy.
- 9) Try an educational "blitz" by publishing "public information" in a variety of formats for use in pre-selection period.
- 10) Be "up front" and involve "opposition" from the very beginning.
- 11) Strengthen the "public participation" section of the guidelines.
- 12) Design sanctuaries for usage--not as wilderness areas.
- 13) Define and clarify the relationship of the sanctuary program to the larger Coastal Zone Management (CZM) program. For example, CZM does not regulate uplands, but ideally, sanctuaries should encompass whole watersheds.
- 14) Encourage adjoining States to cooperate in establishing a sanctuary on their common boundary, using a regional approach.

In addition to the list above, the following ideas were presented to the workshop at a later session as "new ideas for study".

- 1) Define and prescribe the sanctuary's impact on what happens outside its boundaries by drawing up a covenant between the State and local officials and property owners that could be changed only after public review.
- 2) Expand the "pre-acquisition" grant concept to cover site selection process costs, including the public participation process.
- 3) Hire a sanctuary manager during the planning stage to provide continuity from "pre-acquisition" to "program implementation".
- 4) Given limited state funds, modify the sanctuary program to provide financial aid directly to conservation organizations such as The Nature Conservancy.
- 5) Set a time limit on completing acquisition of target areas covered by the grant.
- 6) OCZM should set up a minimum framework of management objectives and a model for a management plan.
- 7) OCZM should start a newsletter for publicity and to improve communication between sanctuary managers.
- 8) OCZM should develop a "booklet" of experiences such as giving examples of "allowed" and "prohibited" uses, typical state matches for grants, and the economic impacts of sanctuaries, for distribution to States that are in the early stages of proposing a sanctuary site.
- 9) OCZM should work on resolving the conflicting objectives within the program to clarify what it is trying to do, such as, preserving unspoiled "natural" areas on the one hand, and encouraging research and public education which require proximity to a population center on the other.
- 10) OCZM should study the impact of existing sanctuaries on local communities (socio-economic, tax loss, environmental, land use, and land values outside the sanctuary) after one year and five year periods, to see how these compare with predictions in the Final Environmental Impact Statement. The results should be shared with States having existing and potential sanctuary sites.
- 11) OCZM should establish a "pathway" to funding for research which includes private foundations.

ESTUARINE SANCTUARIES:
AN UNDERUTILIZED OPPORTUNITY FOR
RESEARCH AND EDUCATION

Edward T. LaRoe¹

The purpose of this workshop is to review the National Estuarine Sanctuary Program, its successes and problems, and to make recommendations about how it might be improved. The workshop provides a unique opportunity for sharing the experience to date of all established sanctuaries. I would like to provide some background and to suggest some areas for your consideration during the days ahead.

The National Estuarine Sanctuary Program is one of the many tools for improved management of our coastal resources provided by the Federal Coastal Zone Management Act (CZMA). Section 315 of the CZMA, as amended, provides for federal matching grants to states, for up to 50 percent of the costs for acquisition, development, and operation, for the purpose of establishing a series of estuarine sanctuaries around the coasts of our nation, including the Great Lakes shoreline. The federal share for any sanctuary is limited to a maximum of \$2,000,000. The objective of the estuarine sanctuaries program is to provide natural field laboratories "in order that scientists and students may be provided the opportunity to examine over a period of time the ecological relationships within the area"².

The guidelines for the program emphasize several major considerations:

- 1) The goal of the national program is to establish a series of sanctuaries that is representative of the ecological and regional variety of estuarine ecosystems found in the United States and its territories. Since the sanctuaries are to be representative, ecologically unique sites are not appropriate candidates.
- 2) The sanctuaries are to be used as natural field laboratories, especially for long-term research and education.

¹ Past President, The Coastal Society.

² Federal Register 39 (108): 19924. Guidelines for the estuarine sanctuary program are contained in 15 CFR 921. They were originally published on June 4, 1974, and have been slightly modified twice since then (FR 39 (252): 45213-45214, and FR 42 (175): 45522-45523).

- 3) The sanctuary boundaries should be chosen on an ecosystem basis, so that, to the extent feasible, they will include the land and water masses which constitute a natural estuarine ecologic unit. This will also result in increased usefulness for research as well as in decreased adverse impacts on the area from external sources of stress.
- 4) The areas selected for sanctuaries should be relatively undisturbed by human activity; they are to represent natural ecological conditions to the extent possible.

To ensure adequate representation of the variety of estuarine ecosystems, the federal regulations utilize a biogeographic classification system which reflects the range of regional and ecological differences. This provides eleven major biogeographic provinces, which were divided into subcategories to reflect special or unique estuarine features (Texas lagoons or Puget Sound are examples). Based on these considerations, the federal Office of Coastal Zone Management (OCZM) proposed that a series of 18 to 22 sanctuaries be developed.

Since 1974, grants have been awarded for seven sanctuaries.³ Although this represents a sound start for the national program, several problems have prevented the program from reaching its full potential. Some of the problems are national in scope, and need to be addressed by OCZM; others may best be addressed by the individual sanctuary programs at the state level; and still others need to be addressed by a greater body, including potential users and research funding agencies. Some of the more prominent problems include the slow progress in establishing new sanctuaries, local opposition, delays in the acquisition process, and lack of use by the research community.

Lack of progress in establishing new sanctuaries

Early in the estuarine sanctuary program, OCZM polled all 34 coastal states and territories concerning interest in establishing sanctuaries. About two-thirds reported that they were indeed interested in receiving a grant for the acquisition and operation of a sanctuary. Many, however, indicated that they planned to delay pursuing creation of a sanctuary in order to place greater immediate emphasis on development of their state coastal zone management programs (Sections 305 and 306, CZMA). This was consistent with the federal emphasis on development of coastal management programs, although it ignored the potential that results from sanctuary research might have provided to the substance and understanding of state management programs.

3

The existing sanctuaries are:

South Slough, Coos Bay, Oregon
 Sapelo Island, Georgia
 Waimanu, Hawaii, Hawaii
 Old Woman Creek, Ohio
 Rookery Bay, Florida
 Apalachicola River/Bay, Florida
 Elkhorn Slough, California

Columbian Province
 Carolinian Province
 Insular Province
 Great Lakes Province
 West Indian Province
 Louisianian Province
 Californian Province

After an initial flurry of interest in the program, when preliminary proposals or sites were reviewed in at least fifteen states,⁴ there has appeared a general lull in sanctuary activity. This is attributable to many factors, including misunderstanding of the sanctuary program and its objectives, false expectations on the part of many states, and the general preoccupation with management program approval. Some states had sensed a new pot of federal dollars and wished to apply them to a variety of purposes at odds with the federal sanctuary objectives. For example, some wished to create parks or areas for intense recreation; others wished to acquire areas for wildlife refuges; and still others sought funds for construction of new physical laboratory facilities. Some of the areas proposed failed to fulfill the ecosystem nature of the program, for they were basically just water areas, lacking the adjacent wetlands or uplands.

One of the most persistent problems is the frequent attempt to use the estuarine sanctuary program as a habitat protection device. While the creation of an estuarine sanctuary should result in habitat protection, that is a by-product of the primary objective: providing representative natural areas for long-term research and education. The selection of sanctuaries in a reactive mode, in response to perceived threats of development, or the dilution of the program by creating scores of small sanctuaries scattered about to protect some critical habitat will result in the failure of the federal objectives. It will also place the program more directly in competition with other federal land acquisition programs, reducing its unique qualities and possibly leading to its elimination in these times of an austere budget. Habitat protection needs are best addressed within the context of a sound coastal management program and by regulatory programs, not by the spot establishment of estuarine sanctuaries.

Local opposition

Significant local opposition has developed to most sanctuary proposals and has caused some proposals to be withdrawn. In general, this opposition has resulted from a few concerns: loss of development potential; loss of local tax revenues; objections by displaced land-owners; and fear of the impacts of the sanctuary on areas outside of the sanctuary boundary. Local opposition, especially by estuarine user groups, is often based on fears that the sanctuary designation will preclude some traditional use such as sport or commercial fishing.

⁴ States which submitted preliminary proposals, or which requested site reviews of potential sites during the first 15 months of the program included Maine, Massachusetts, Maryland, North Carolina, South Carolina, Georgia, Florida, Puerto Rico, Virgin Islands, New York, Ohio, Michigan, Wisconsin, Washington, Oregon, California, and Hawaii.

Delay in completing acquisition of sanctuary lands

Although the first sanctuary grant was awarded over five years ago, land acquisition has not been completed for most of the sanctuaries. In general, the process of acquisition has been more difficult and time-consuming than originally envisioned. This delay is caused, in part, by insufficient funding, leading to prolonged negotiations; the large number of owners in some sanctuaries; the unavailability of eminent domain as an assistance to acquisition; and opposition by local governments and some landowners. In large part, however, it may simply reflect unreal expectations; other acquisition programs operating under generally similar conditions have often taken as long, or longer, to complete.

Lack of use

Response to the establishment of the initial estuarine sanctuaries has not been as strong as was initially hoped. Again, only one sanctuary is fully established, and there have been fewer than three years, on the average, since grants for acquisition were first awarded. Yet, there are no formalized research plans or educational programs that have been developed to utilize the sanctuaries. Each sanctuary manager has experienced common problems in attracting research users and funds to his sanctuary.

In addition, educational use of the sanctuaries is almost nonexistent. The sanctuaries offer an exceptional opportunity for use by school groups and by the general public as an aid in the development of a better understanding of the importance of estuaries and the need for coastal management. Although this would tend to provide support for state coastal management programs, only one state has maintained strong ties between its coastal program and its estuarine sanctuary.

Recommendations

Several solutions for improving the utility of the estuarine sanctuary program can be made. These suggestions fall into several categories, requiring action by a variety of interests.

Many of the problems identified reflect a poor understanding of the federal program and its impacts. Working with the states, OCZM should initiate efforts to increase the general level of awareness and understanding of the National Estuarine Sanctuary Program objectives and effects. Not only should OCZM and the individual states increase their emphasis on the program, but they should develop efforts to increase understanding by special interests, local government, and the general public.

These concerns have been addressed to some extent in the sanctuary environmental impact statements. The statements for South Slough, Oregon, and Apalachicola, in particular, have attempted to address local and economic issues. There is an exceptional opportunity, however, for a more intense response to these recurrent problems. OCZM should initiate and fund follow-up studies to assess the effects of sanctuary designation, especially on local revenues including the initial loss of tax-base and the increase in tax revenues as the value of adjacent lands is enhanced by the sanctuary.

In addition, there needs to be a greater involvement with the public and local governments during the process of sanctuary selection and development. Frequently, the proposal is not released to the public until it is well-developed and major decisions have been made. Positive involvement and coordination during earlier stages of development of the proposal can effectively dispel unfounded concerns and be used to modify the proposal to avoid or minimize legitimate ones. The public education process should start during the development of a sanctuary proposal.

Now that more than half of the state coastal zone management programs have received federal approval, states and OCZM should increase attention given to the sanctuary program. While working with states, OCZM might assume a more prominent role in the identification of potential sanctuary sites on a biogeographic regional basis. In doing so, OCZM should reemphasize the basic criteria for sanctuaries: representativeness (not ecological uniqueness), naturalness, the ecosystem concept, and the usefulness for long-term research and education.

The variety of interests -- federal, state, and private -- need to make a more concerted effort to assure that sanctuaries are used to their maximum benefit. In part, this would involve the identification of state and national research needs. OCZM should coordinate efforts between sanctuary managers, federal and state resource managers (such as the Army Corps of Engineers, Environmental Protection Agency, U.S. Fish and Wildlife Service, and state planning and regulatory agencies), scientists, and research funding agencies to identify basic research needs. Research should be coordinated among all sanctuaries. Of special value will be the ability to compare ecosystem dynamics among sanctuaries in different biogeographic provinces. This might help answer, for example, questions about the validity of applying southeast marsh productivity concepts to west coast marshes.

Funding is another problem related to sanctuary use. OCZM should identify and assist the states in utilizing appropriate sources of funding. In particular, OCZM should work with the national Sea Grant Program, the National Science Foundation, the Environmental Protection Agency, and the Army Corps of Engineers, and seek better utilization of funding for research and education in sanctuaries. It will not be necessary to earmark funds specifically for sanctuary use; rather, these funding agencies should support research (particularly that which would be enhanced by the long-term protection and stability of the estuarine ecosystem, or where a control is required) for the established estuarine sanctuaries.

Many scientists and educators are unaware of the estuarine sanctuary program; OCZM and state sanctuary managers should seek more direct interaction with estuarine scientists and coastal educators to make them aware of the potential provided by the sanctuaries. Another means of securing increased use, awareness, and coordination of research and funding would be to develop more formal associations with organized efforts that have an estuarine interest. For example, the sanctuary program could be used to complement the efforts of the Man and the Biosphere program (MAB Committee 5b: coastal wetlands), the Department of the Interior's Natural Landmark Heritage Program, the Federal Committee on Ecological Reserves, The Nature Conservancy, and the Institute of Ecology's biopreserve concepts.

Since it lacks the technical support staff in-house, OCZM might consider establishing a small technical advisory group to assist in a number of efforts, such as identifying national research needs, sources of funding, and potential complementary efforts. The group could also serve as a liaison for OCZM with the research and education communities.

There is a strong need to improve communication among the sanctuary managers. Many have had common experiences and there is no need for each to experience problems that others may have successfully overcome. These experiences and solutions should be shared. The managers, preferably with OCZM assistance, should consider holding annual meetings to discuss their problems and activities.

Consideration should also be given to increasing the available funding for the acquisition and operation of estuarine sanctuaries. In particular, it might be appropriate to alter the 50 percent state match requirement, to allow other federal funding as a source of match, or to remove the \$2,000,000 limit to the federal contributions for each sanctuary. Other sources of funding, such as provided in Sections 306 and 310 of the CZMA, should be explored for operational, research, and educational expenses.

With the exception of the last consideration, all of these suggestions can be implemented administratively, without change in legislation or program guidelines.

The interest demonstrated in this workshop indicates that the concept behind and the need for the Estuarine Sanctuary Program remains. The program offers a real opportunity for the long-term research and education which is necessary for sound coastal resource management. Even if judged only by the seven sanctuaries now established, it would have to be judged a success. Nevertheless, there are common concerns and problems which face the program, and some changes might be considered in order that it may achieve its full potential.

THE DESIGNATION OF AN ESTUARINE SANCTUARY:

WHAT'S IN IT FOR THE PUBLIC?

Les Strnad¹

As a representative of the most recent state to complete the estuarine sanctuary process, I'd like to reflect on one of the most difficult aspects of the process - public involvement. Perhaps Dr. LaRoe's paper on "Estuarine Sanctuaries - the Oregon Experience", published in the Coastal Zone Management Journal (Vol. 1, No. 4), gave many of us involved in the designation of sanctuaries the clearest indication of an appropriate procedure to follow within the context of the federal sanctuary regulations. In his generalized framework, he discussed the salient point of public participation. He said:

"At an early stage in the development of (an) application - while alternatives are still being assessed - (a) state ought to involve all affected and interested parties, such as local government officials and agencies with a direct jurisdiction, potentially affected landowners, and concerned citizens or other groups. (A) state has a responsibility to involve the public in a meaningful fashion in the development and review of its proposal". (emphasis added)

LaRoe goes on to point out that, although the Office of Coastal Zone Management (OCZM) is responsible for complying with the National Environmental Policy Act (NEPA), which requires a public hearing/ participation process, a state should not rely upon the Federal NEPA process to "fulfill its own obligations". Specifically, he concludes by saying that:

"As a result of these opportunities for public input, (a) state should be able to anticipate local political and public reaction to the proposal". (emphasis added)

The message I received from these comments was that public involvement in the development of an estuarine sanctuary program must go beyond simple participation; indeed, to be truly effective, it must include an educational process. Only then can there be "meaningful involvement" for all interested parties. Unfortunately, my observation of governmental management of the sanctuary process, as well as other resource management programs in California, indicates that the methodology utilized has resulted in a less than meaningful public participation effort. My state-

¹ California Coastal Commission.

ment is based on six years of experience with the interim regulatory control and planning programs of the California Coastal Commission. Specifically, my involvement includes assisting in the preparation of the 1975 California Coastal Plan, the current local coastal program planning process, as well as being the project coordinator for the Estuarine Sanctuary Program since 1976.

During this period, I can unequivocally state that public participation was, for the Commission and staff alike, one of the highest priorities in California's coastal zone management process - and still is. We continually seek ways of increasing public involvement by improving media communication and creating citizen and technical advisory committees for the more interested individuals and groups. Yet, despite these extraordinary efforts, at high dollar costs, many members of the public are hostile toward the governmental action at the end of the planning process. This was the case with California's estuarine sanctuary process.

The reasons for the public's hostile feelings are numerous and complex. In my opinion, a major factor has been the extremely fast development of land use planning processes in California. This has resulted in the police power (regulatory authority) replacing educational methods for achieving public acceptance of our programs. Obviously, regulation as a legal approach is very effective for achieving quick results, while educational processes take much longer and involves a risk in attaining our resource management objectives. The National Estuarine Sanctuary Program can be no higher priority than the public's understanding and support, if it is to have a lasting impact.

In light of these factors, I'd like to make several observations which correlate our experience in California to the Estuarine Sanctuary Program and Dr. LaRoe's comments.

First, my state agency or any organization initiating a sanctuary nomination process must recognize that a society-wide change is taking place - a change in the public's attitude toward governmental management, programs, and regulations. The change I'm speaking of is not the enthusiastic support of environmental causes and innovative land use techniques and programs of the late 1960's and early 1970's, but a growing public skepticism of government. In California, this attitude culminated in the Proposition 13 tax initiative, whose repercussions are now being felt throughout our country.

Second, faced with an growing public attitude that less government is better, we must develop new techniques to achieve meaningful public involvement in the sanctuary process. In relationship to the national program, new sanctuary proposals and management plans must be built upon the experiences and beneficial aspects of the existing estuarine sanctuaries. The public education program must begin early in the application process, while alternatives are being assessed. This is when we will have the best opportunity to explain the value of estuarine benefits and sanctuary designation for their local area.

One obstacle to this approach is that each state, in utilizing the federal estuarine sanctuary guidelines and various regionalized nomination procedures, tries to sell the public on a rather vague concept plan.

Very few details, such as management goals and criteria, number of parcels, and economic impacts, are available in the first steps of the proposal process, and thus contact with the public generally raises more questions than answers.

Without sufficient information, public reaction is likely to include skepticism, suspicion, fear, and blind opposition. The word "sanctuary" alone alienates some members of the public before the process even begins. Those few reactionary groups and individuals who tend to resist any forum for discussing ways to resolve conflicts or exchange information will gain a large audience. At that point, meaningful involvement of the public in the planning process, regardless of the methods we devise for full public participation, becomes impossible.

Third, therefore, an informed and consenting public is essential if resource-management programs or regulations are to be developed and then efficiently and effectively implemented. The public's generally critical attitude toward governmental intervention is not likely to change in the near future. Therefore, the public's image of government management programs must be overcome early in the nomination process.

Accordingly, public education can play an invaluable role in establishing public understanding for estuarine resource protection. Such understanding will pave the way for meaningful public involvement, which in turn is more likely to provide for broad public acceptance.

Fourth, the ultimate responsibility for enhancing, maintaining, and managing the Estuarine Sanctuary Program rests with the administrators of the designated sanctuary units. Through a unified program, with the ability to exchange information readily on all aspects of the program, such as nomination, management, and research, agencies or operations personnel at each sanctuary could provide factual information to the interested public. While no single method will resolve every difficult situation that might arise in establishing a sanctuary, a combination of education and information techniques would appear to improve upon the overall designation/management framework.

Fifth, the first four points addressed the concept of public participation (or lack of it), the concern about growing bureaucracy, and our combined responsibility for resolving these issues. The timing of meaningful public involvement, involving more than just special interest groups, is an important question. This meaningful involvement must take place during the sanctuary candidate selection process, not after a final site has been nominated. While the regulations presently provide for detailed evaluation of only one candidate site, we need an expansion of the data available in the nomination process to cover perhaps three or more candidate sites. This process should include contact with affected land-owners and concerned citizens. The preliminary acquisition grant section of the guidelines should be revised.

Modification in the preliminary grant process could serve two purposes. First, the selection process would designate not only the primary candidate for the biogeographic region, but also identify candidate sites within subcategories of each region for future consideration.

Second, more information would be made available early in the public participation process, reducing the public's fear of the outcome of "concept" planning using ambiguous Federal guidelines. The direct benefit from such a change is greater public awareness with possible expansion of the national program through greater efficiency and government credibility.

Since, the agency(ies) conducting the nomination process often have more regulatory authority over the proposed sanctuary area, the public is not likely to view them as being unbiased. The result may be further difficulty for the designation procedure. An alternative approach could include the use of third party/disinterested non-governmental consultants or organizations to conduct the nomination process under guidance from OCZM and the respective state(s).

Sixth, Proposition 13 caused our state government to analyze its programs. Perhaps government cannot do what the people would like - do more for the people while spending less; however, we might be able to do more for the people without waste and duplication. We need to demonstrate to the public that the sanctuaries of today will benefit tomorrow, that the sanctuaries are not simply playgrounds for academics and the elite, and that the management techniques and research data obtained from the sanctuaries will provide some economic benefit to the public. This information can be gained through an effort to combine our experiences in the established units of the National Estuarine Sanctuary Program.

National workshops for sanctuary administrators/managers are a beginning toward that coordination, but we certainly cannot afford a national workshop every four to six months. Additional communication and information techniques for the national network of sanctuaries are essential.

A bi-monthly newsletter (similar to Sea Grants' newsletter), lease-line telephone communication, multi-media forms of information including brochures, slide shows, and a computer network for all sanctuaries, and even an Association of Estuarine Sanctuary Administrators are some of the forms of communication we should explore. Without a concerted effort on our part, each sanctuary designated may go on as an isolated unit, rather than an integral part of the National Estuarine Sanctuary Program. If we are to meaningfully involve the public in all aspects of the sanctuary program, then we must first involve ourselves.

THE VIRGINIA COAST RESERVE-
A PRIVATELY-OWNED SANCTUARY

Gerard J. Hennessey¹

The Nature Conservancy has used the tools of the private enterprise system to create the Virginia Coast Reserve, an estuarine sanctuary similar in scope and purpose to those sanctuaries protected through provisions in the Coastal Zone Management Act. The Virginia Coast Reserve is one of more than 2000 projects conducted by The Nature Conservancy, an organization dedicated to the protection of environmentally significant lands and the natural diversity which these lands support.

The Virginia Coast Reserve

The Virginia Coast Reserve is located at the southern end of the Delaware-Maryland-Virginia peninsula. Located on the Eastern Shore of Virginia in Accomack and Northampton Counties, the reserve contains approximately 35,000 acres of barrier islands and salt marshes. The Conservancy owns all or part of thirteen coastal islands. It is the Conservancy's belief, confirmed by several experts in coastal ecology, that the Virginia Coast Reserve represents the largest protected, least ecologically-disturbed set of barrier islands on our Atlantic or Gulf coasts. The Nature Conservancy manages the reserve from a local headquarters on the Eastern Shore.

In addition to the important natural values protected in the Virginia Coast Reserve, The Nature Conservancy's program, like the estuarine sanctuary program, is designed to bolster research, educational, recreational, and traditional life-style usages of the reserve and its surrounding wetland areas. The protection of so large a parcel of ocean-front real estate generates certain opportunities among many segments of the surrounding community. In particular, traditional lifestyle values of local watermen have been protected and enhanced. The maintenance of the Virginia barrier islands in their natural state has insured that the estuarine waters on the seaside of Virginia's Eastern Shore will not be spoiled by beachfront development.

The Virginia coast was previously targeted for precisely this kind of oceanfront building. When the Conservancy first began its land acquisition program on the Virginia coast, a development known as King's Beach was planned for the southern three islands which the Conservancy initially acquired. The area was planned to be bulkheaded and filled to ten feet above sea level. Ten thousand individual dwellings and commercial

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units were to be created and marketed. Smith Island, one of the three islands, was to be connected to the mainland by an elevated causeway. Earlier, in the 1950's, a similar development had been planned for Cedar Island in Accomack County. In this instance, the developer initially subdivided a large portion of the island and marketed many hundreds of lots to land speculators and potential builders.

The Nature Conservancy had long been aware of the Virginia barrier islands, their undisturbed nature and the possibility that at some moment they could quickly be "lost" as were Ocean City, Maryland, on Fenwick Island to the north, and Virginia Beach, Virginia, to the south. The Conservancy often protects important natural areas by purchasing them directly from their owners. In 1969, with the threat of the development of Smith Island pending and the apparent "domino effect" that this would precipitate for the development of the other islands, the Conservancy acted to protect the Virginia barrier island archipelago. Funds for the purchase of the Smith Island complex were solicited from the Mary Flagler Cary Charitable Trust, a New York-based philanthropy. The Trust responded by providing the funds to purchase Smith Island and by giving the Conservancy its approval to negotiate for purchase of any the other Virginia barrier islands that it could acquire. Other islands in the reserve were subsequently acquired using a variety of methods including purchase at bargain sale price (with the vendor claiming the difference between fair market value and the sales price as a charitable donation), donations of land, and, in one instance, the formation of a bogus corporation which served as a front organization to purchase an island for the Conservancy from an owner who wished to sell only to "development interests".

Developing a Management Plan

By 1974, the majority of the Virginia Coast Reserve had been purchased. Major gaps in an understanding of the natural processes, cultural traditions, legal complexities, and management requirements of this property were quickly apparent when the Conservancy assessed its property. The Virginia Coast Reserve Study was designed to identify and develop a management framework which would take into account these significant elements for island protection.

Study Objectives - The goal of the Nature Conservancy's involvement with the Virginia barrier islands has always been to insure the perpetual preservation of this unique barrier island-lagoon ecosystem. The overall objective of this study was to establish a baseline of information that would yield an understanding of the significant factors the Conservancy would need to consider in governing the island system. The study was divided into four sections and objectives were set for each.

- 1) Objectives of the Legislative Compendium, Title Search, and Acquisition Priorities section included:
 - a) providing The Nature Conservancy with a clear image of its ownership and inholdings within the reserve system;

- b) compiling the legislation which pertains to the ownership of the islands and marshland, and adjacent riparian and sub-aquatic rights to determine how it affects land stewardship; and
 - c) establishing a strategy for the acquisition of additional key lands within this island-lagoon system that are worthy of preservation from an ecological or strategical perspective.
- 2) Objectives of the Ecosystem Description section included:
- a) identifying the limiting ecological factors which must be known in order to preserve the unique qualities of the reserve; and
 - b) defining the ecological components of the system as a first step in establishing a monitoring program which will expose the scientific community to the potential for innovative research possibilities within the Virginia Coast Reserve.
- 3) Objectives of the Social and Economic Analysis section included:
- a) establishing economic baseline information about the two counties where the reserve is located;
 - b) assessing effects of the preservation of the Virginia Coast Reserve on local communities;
 - c) assessing the impacts of potential regional growth, land use, and recreational needs on the Virginia Coast Reserve;
 - d) assessing the indirect socio-economic benefits of the Virginia Coast Reserve associated with preservation of the island system; and
 - e) determining popular opinion regarding preservation of the Virginia Coast Reserve islands.
- 4) Objectives of the Stewardship section of the Virginia Coast Reserve Study included:
- a) developing a list of the stewardship needs and procedures which offer maximum protection;
 - b) determining agencies capable of accomplishing these responsibilities, including where ultimate stewardship responsibility should lie;
 - c) establishing a preliminary management scheme accommodating preservation, research, education, and if appropriate, recreation; and
 - d) determining the costs of implementing this management scheme.

To achieve these objectives, the Virginia Coast Reserve Study coalesced the efforts of more than thirty professional, administrative, and research personnel. The experience and input of Eastern Shore residents also contributed to collecting this data.

Legislative Compendium, Title Search and Acquisition - At the time of acquisition, the Conservancy became part of a number of ownership difficulties including counter-claims, diverging interpretations in the chain of title to certain tracts, varying interpretations of existing island and wetlands-related legislation, and threats to the effectiveness of our preservation scheme from "inholdings" within the island system and lands owned adjacent to the reserve. We employed the full-time assistance of an environmental lawyer to catalogue, interpret and resolve these difficulties.

A complete title search was also conducted to determine the present ownership pattern on the barrier islands. This ownership information was used to assess the security of the Conservancy's present position as the controlling landowner within the island system. A review of the situation fostered the preparation of an acquisition strategy designed to fill the gaps in the present pattern of ownership.

At the same time, the complex environmental legislation at federal, state and local levels pertinent to the administration of this marine wetlands area was collected. The laws which may be used to insure the integrity of the reserve were assembled.

Ecosystem Description - Existing information about the natural history of the reserve had been collected. The documentation of existing material included compilation of publications, maps, aerial photographs and other supportive material. Comprehensive ecological data was scarce. Some information was available in the fields of geology, ornithology, and rudimentary plant community associations. A substantial body of material existed for the nearshore fisheries.

Additional basic field work was also completed to compliment the collected data. Supplementary work was undertaken so that predictions and stewardship decisions could be based on a fundamental understanding of the ecology of the Virginia Coast Reserve system.

Social and Economic Analysis - The barrier islands represent a valuable resource to the Eastern Shore of Virginia. They offer a livelihood to some by protecting marshland which provide a haven for marketable fish and shellfish. They protect seaside residents by buffering the shoreline from storm surges and winds. Additional intangible benefits are realized by a wider spectrum of the population. The islands are an integral part of the rural life style, the preferred quality of life, of Eastern Shore residents.

These aspects, the benefits of the Virginia barrier islands to the local economy, lifestyle, and the residents' perception of the Eastern Shore, are analyzed in this section of the study. The Conservancy is the largest property owner in both Accomack and Northampton Counties. Addressing the economic and social arguments about preservation of this large system required the full-time assistance of an economist and the

assistance of several academics from Salisbury State College, a local institution.

The economic analysis centered on the benefits and costs of barrier island preservation. This approach incorporated their tangible benefits and costs to the local communities and tangible and intangible benefits on a regional basis. Additionally, a detailed analysis of Virginia's Eastern Shore economy, in terms of the utilization of the local resource base, was conducted. The intent of this investigation was to assess the effect of barrier island preservation on the Eastern Shore's citizenry from the economic perspective.

The "quality of life" on the Eastern Shore is often debated in local circles. The average citizens' perception of their lifestyle is tied to the satisfaction or dissatisfaction they express about The Nature Conservancy's natural area acquisition philosophy. The Conservancy was interested in determining whether its island activities met with local sentiment. An opinion poll of Eastern Shore citizens was conducted. Its aim was to gather the data needed to determine whether local residents were happy with life in the area, and the barrier islands as managed by the Conservancy.

Stewardship - Effective administration of the reserve by any agency depends on the recognition of stewardship realities. These realities were assessed in this section of the Virginia Coast Reserve Study, and a scheme to deal with them was proposed.

Initially, a list of needs and procedures for preserving Virginia's barrier islands was developed. Most of this section of the study dealt with how to insure their fulfillment.

One unknown for the Virginia barrier island preservation strategy was the ultimate managing agency. The Conservancy's traditional policy had been to transfer management of some of its finest preserves to federal or state agencies. Recently, a decision to internalize the management of selected preserves was made in accordance with The Nature Conservancy's model preserve "1980 Program". These conflicting policies had to be resolved.

The stewardship capabilities and policies of The Nature Conservancy, and selected federal, state, and county agencies were examined. Management interests of each group interested in the islands were assessed. Each agency's program was inspected to see whether it fit into the Conservancy's plan for preservation of the reserve. A review of their legislative, financial, and enforcement abilities was also completed.

Implementing the Study

Based on the information accumulated in the Virginia Coast Reserve Study, The Nature Conservancy decided to retain ownership of the Virginia barrier islands. It was decided that a private alternative to management by a government agency could adequately protect the island resources as well as demonstrate to the public that the Conservancy can provide an alternative to government protection and conservation of resource amenities.

The economic analysis section pointed out that a market failure exists within the free enterprise system which prohibits private organizations from managing natural areas. With the creation of non-profit organizations such as The Nature Conservancy, the public has an option for protecting these natural areas. Charitable contributions to the Conservancy are tax deductible. Essentially, donations to protect land through our programs are attractive alternatives to paying taxes to the federal government for many people.

The Nature Conservancy was provided with a five year interim management budget with which to launch this program. During this period, a management endowment must be raised. These funds will generate operating capital for managing and protecting the reserve.

The operation of the reserve is designed to protect the natural diversity of Virginia's barrier islands. To do this, we have set up a series of policies which allow for use of the islands while protecting their natural components. Simply stated, the Conservancy allows day use in many island areas. The permitted activities include; nature study, hiking, beach combing, swimming, surf fishing, and photography. Waterfowl hunting is permitted only in low salt marsh areas of the reserve. Airplanes, motor vehicles, overnight camping, camp fires, domestic animals, and destruction of plant and animal life are prohibited. Many areas below mean high tide are open to shell fishing.

Other Suggestions

Mainland Headquarters - The decision to retain the Virginia Coast Reserve also committed the Conservancy to establishing headquarters on the seaside of the Virginia Eastern Shore at the approximate center of the Virginia Coast Reserve. After three years of experience we have found that renting space, including manager's headquarters, dock facilities, and other marine-related expenses, was an inefficient mode of operation. As a result, a farm with a deep water creek was purchased. Here a historic structure, an 1806 Virginia plantation home, is being developed into the focal point for the Virginia Coast Reserve. The acquisition and restoration of this historic structure has won the Conservancy additional local support in this rural Virginia community. Through this effort, we have been able to join the interests of many conservationists and historical restoration enthusiasts. We feel that both sides have something to gain and appreciate from this experience.

Research Interest - At the inception of the Virginia Coast Reserve Study, approximately 35 independent researchers were compiling data about the Virginia barrier islands. Since this study has been completed, five Virginia universities have actively begun research and educational work in the reserve. Old Dominion University has committed itself to developing a Virginia barrier island field station. This kind of research, education, and community involvement will strengthen our ability to protect the islands.

Local Input - We established an advisory panel recently. This panel will receive input from local citizens representing business, government, recreation, and seafood processing and harvesting segments of the local community. The panel is designed to bridge the gap between

the Conservancy's scientifically sound conservation objectives and the local community, which sometimes views us as an "outside organization".

This potential for public resentment is something which estuarine sanctuaries should identify and address at their inception. Experience has repeatedly shown that appreciation for the good work at a conservation area is inversely proportional to the distance from the site where the work is being done. Local people often understand the objectives of the organization and the objectives of area management least. The Virginia Coast Reserve has been the subject of a good deal of public misinformation, resentment, and a law suit contesting title to some of the Conservancy's property. One of the caveats of establishing an estuarine sanctuary should be a good secure title, and title insurance should be acquired for all property.

Layers of Protection - A key in developing a management program should be to establish interlocking responsibilities for resource protection. In the Virginia Coast Reserve, The Nature Conservancy has aggressively pursued various overlapping "layers of protection". We feel that these layers offered by various governmental organizations and private professional organizations help to reinforce the importance of the values which the single owner, in this case The Nature Conservancy, is responsible for protecting. Organizational policies often change, and with this in mind, sanctuary managers should actively enhance these layers of protection. Specifically, the Conservancy has enrolled the Virginia Coast Reserve in protective programs offered by local land use plans, the Heritage Conservation and Recreation Service's National Natural Landmark Program, the United Nations (UNESCO) Man and the Biosphere, Biosphere Reserve Program, and the Society of American Foresters' Natural Area Program. In the future, we hope to formally affiliate ourselves with the Office of Coastal Zone Management's Estuarine Sanctuary Program and the U.S. Fish and Wildlife Service's Cooperative Easement Program for protection of our natural assets.

Friends of the Virginia Coast Reserve - The Nature Conservancy has established a Friends of the Virginia Coast Reserve organization. Members have made a modest financial contribution to support our reserve management program. To date, almost 700 individuals have contributed approximately \$22,000. Beyond the value of these funds, the Friends of the Virginia Coast Reserve are a voice or a "constituency" for the island reserve. The Friends group includes residents of Virginia, Delaware, and Maryland. A small portion of the group, approximately 100 members, comes from the Eastern Shore of Virginia. This group of supporters can be mobilized if the preserve is ever threatened. In addition, they spread good will about the reserve through informal local contacts in a way that compliments the activities of the professional staff. Friends of the Virginia Coast Reserve members keep informed about our management activities through a periodic publication, entitled The Islands.

The Future

The prognosis for the protection of the Virginia Coast Reserve appears good. Our major goals identified in the Virginia Coast Reserve Study have been met. We have acquired a mainland headquarters and have a competent staff in residence. Community support for our program is

increasing. The private management alternative to "public" areas seems to be more attractive as people increasingly rebel against government management of large tracts of lands. We are developing an endowed source to generate operating capital for the reserve. If this endowment drive is successful, we feel that the Conservancy will continue to manage the Virginia barrier islands as a privately-maintained "estuarine sanctuary" for the life of our organization.

PERSPECTIVES IN EVALUATING THE ECONOMIC IMPACT
FROM ESTUARINE SANCTUARIES

Steve Leitman¹

Abstract

It is recommended that in analyzing impacts from an estuarine sanctuary, three distinct analyses be made; one at a local level, one at a regional level, and one at a state/federal level. Factors to be evaluated at each level are reviewed. Several economic research questions are posed to managers of existing sanctuaries. It is recommended that a multi-disciplinary team, including an economist, be involved in preparing sanctuary proposals and accompanying environmental impact statements.

Introduction

Net economic impacts of an estuarine sanctuary proposal can be an important factor in deciding whether an estuarine ecosystem is ultimately protected. The purposes of this paper are to discuss methodologies for determining the economic impact from establishing estuarine sanctuaries, and to note economic research efforts which should be conducted at established sanctuaries to enhance our understanding of how designation impacts the local, regional and national economy. Much of the information in this paper was developed while preparing the environmental impact statements for the Apalachicola River and Bay Estuarine Sanctuary.

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Estuaries are both economically and ecologically important, although many of the benefits they provide are difficult to quantify in dollar terms. In general, estuaries provide many "free" economic services to society. About two-thirds of the commercial and sports fishing catches in the United States are estuarine-dependent. Estuaries can serve as spawning grounds, nurseries, homes, and feeding chains to the benefit of numerous marine species. Wetlands can prevent or at least mitigate damages from erosion, tidal forces, or floods via their ability to act as buffer areas between land and sea, and their ability to store large amounts of water. Estuaries and marshes help to counteract air and water pollution through oxidation, which converts carbon monoxide to the less harmful carbon dioxide, and through the actions of marsh vegetation that causes silt in the water to settle quickly. Gosselink, *et al*, (1974) documented the additional estuarine function of sewage treatment, since marsh areas remove and assimilate nutrients from polluted water.

The designation of an estuarine sanctuary can also lead to direct economic benefits to local communities. Increased utilization of the estuary by tourists, students, researchers, and recreationists can be expected to result from sanctuary designation. The money these people spend in the sanctuary area will benefit the local economy through the multiplier effect. The multiplier effect may also benefit the community when the land is purchased with federal funds, for real estate values around preserved open spaces tend to rise (Hammar, *et al*, 1974). Furthermore, when the sanctuary management committee hires the sanctuary employee(s), staff salary will most likely be spent in the immediate area.

Analysis of Impacts

In addition to complying with the legal requirements for preparing environmental impact statements, it is important to thoroughly understand the socio-economic tradeoffs of designating a sanctuary. A detailed analysis of these tradeoffs will permit the development of sanctuary management plans which will be more acceptable to and harmonious with local and regional concerns. In the case of the Apalachicola River and Bay Estuarine Sanctuary, the site was located in a relatively pristine, though heavily utilized, location. Therefore, in developing the EIS, we chose to integrate all relevant economic conclusions and facts into the body of the EIS and a 15-page appendicized economic assessment. The inclusion of this information was helpful since the possible economic impacts of the proposed sanctuary on up-stream users of the basin caused controversy.

In analyzing the impacts from the sanctuary designation, we took a systems approach based on the hypothesis that an ecosystem can best be understood by first discovering how the system functions in relation to the next larger system which affects it. In our case, to fully understand the impacts of including the Apalachicola Bay and lower river in the national estuarine system, we had to understand how the bay was functionally related to the entire Apalachicola-Chattahoochee-Flint River System.

We did three separate analyses of the impacts to accomplish this task; one at the local level, one at the regional level, and one at the

state/federal level. But the benefits and costs from these analyses were tabulated independently, and could not be summed to determine the net impact from the sanctuary designation.

There are many other difficulties inherent in any attempt to accurately measure the economic impacts of a proposed estuarine sanctuary. As Julia Friedman has noted, precise analysis is complicated by the fact that an estuarine sanctuary can be viewed as "a store of public values due to the ecological, cultural, recreational, aesthetic, historic and economic services provided by the preserve... Thus, an estuarine sanctuary is more valuable to future generations than current ones." (Friedman, 1977)

Consequently, the long-term positive impacts of an estuarine sanctuary devoted to long-term research and education programs are far more difficult to measure than the short-run positive and negative impacts.

Local Impacts

In the designation of most sanctuaries, local impacts will probably comprise the greatest public concern. Included under this category are impacts upon the local tax base, impacts from injecting federal and state monies into the sanctuary area, impacts from precluding further development in the purchase area, impacts upon tourism, renewable and non-renewable resources in the sanctuary area and adjacent land uses, and research and educational impacts.

To determine which impacts will be significant for a specific estuarine sanctuary proposal, the analyst must be familiar with the existing environment and its ongoing and probable future uses, and relate this knowledge to the specific management plan for the proposed sanctuary.

In the Apalachicola example, local impacts of most concern dealt with the local tax base and the fishing industry. Tax base concerns centered around the fact that the sanctuary designation could take nearly 12,500 acres, or \$9,000 per year at the current millage rate, off the county tax rolls. As a result of the sanctuary designation, local governments see their tangible incomes being reduced for intangible benefits. This is a serious concern to local governments, especially in a case like the Apalachicola proposal where only \$326,700 of the \$3,500,000 in acquisition money would flow directly into the county. The remainder goes to Florida and Georgia corporations and residents located outside of Franklin County. This dilemma was handled by hypothesizing that the sanctuary designation would stimulate land values in other parts of the local region which are better-suited for development. We considered land values on St. George Island, a developing barrier island adjacent to the sanctuary, in comparison to the purchase area. We showed that if the sanctuary designation increased the value of parcels on the island only 3 percent, tax losses would be offset. Although this increase seems reasonable, to our knowledge no work has been done at any of the existing estuarine sanctuaries to document this hypothesis. Such research is recommended.

The other local impact of concern, upon fishing, was more of a perceived impact than an actual impact. Because of the name "sanctuary", many local interests initially interpreted the designation as an attempt to prevent fishing and other uses. There was never any intention to preclude or additionally restrict commercial or recreational fishing by the sanctuary designation, and this misconception was alleviated by including fishing as an "allowed use" within the sanctuary. In this vein, many of the comments on the proposed program were more of a reaction to people's perceptions of the word "sanctuary" rather than specific comments about the management program for the Apalachicola River and Bay Estuarine Sanctuary.

River Basin Impacts

The importance of this level of impact will vary with the site. At Apalachicola, perceived impacts at this level proved to be the most troublesome since the river drainage is used for navigation, commercial and recreational fishing, other forms of recreation including boating in several manmade impoundments in Alabama and Georgia, a source of hydro-power, and a source of drinking water for the City of Atlanta. Consequently, the river is managed in a way that attempts to maximize a variety of objectives which are sometimes in conflict. In the early stages of designation all interests were quite suspicious.

Our tactic for analyzing river basin impacts was simply to define all current uses of the river system and to examine the sanctuary's compatibility with each use. I'd recommend a similar approach for future analyses of the economic impacts of proposed sanctuaries.

Once a matrix to determine preliminary impacts is completed, a more detailed analysis should be conducted for any uses which may have a conflict because of sanctuary designation.

The objective or use which created the most problem in this instance was navigation. Although navigational interests viewed the sanctuary as a means of impeding navigation on the river, our analysis concluded that: "The sanctuary is not anticipated to have any long-term negative impacts on Federal navigation projects. Rather, the sanctuary is expected to focus its research efforts in areas that will resolve existing conflicts and provide decision-makers with objective criteria by which to evaluate the implications of future navigation projects. Consequently, the long-term impacts on navigation are anticipated to be beneficial" (Leitman and Roy, 1979). Needless to say, navigation interests were not satisfied with our conclusions and lobbied strongly to block sanctuary designation.

Ironically, our conclusions proved to be prophetic. In response to the public meeting held in April 1979 to hear reactions to the Draft EIS, a tri-state governors conference on navigation problems in the Apalachicola River was held, and the Corps of Engineers and the Florida Department of Environmental Regulation initiated negotiations to establish a five-year spoil disposal plan for all federally-maintained navigation channels which lie within sanctuary boundaries. Since this meeting, the Department of Environmental Regulation has also issued ten-year permits for desnaging and maintenance dredging in the Apalachicola River.

State/Federal Impacts

This level of impact will probably be of least concern. In creating the estuarine sanctuary program the federal government has already decided that it is "worthwhile" to establish estuarine sanctuaries. Likewise, an individual state's action to apply for specific designation indicates that the state considers it worthwhile.

The economic tradeoffs on the federal and state levels basically center around taking on certain fiscal responsibilities in exchange for an enhanced understanding of the functioning of an estuarine system, and perhaps, an enhanced attraction for tourists.

Problems in Preparing Economic Evaluations for Estuarine Sanctuary Proposals

As noted earlier, a major problem with analyzing the economic impacts from establishing an estuarine sanctuary is that many of the benefits from sanctuaries are difficult to quantify. For example, how does one quantify the benefits to students using the sanctuary for educational purposes so that these benefits can be equitably compared to the cash expenditures for purchase and operation of the sanctuary? Or, how does one place a value on the research benefits derived from the sanctuary?

To further complicate the matter, estuarine sanctuaries have been in existence for only a few years and little work has been done on the economic impacts of establishing a sanctuary. Hence, we have no prior experience on which to base our analysis.

We responded to this situation by quantifying the impacts which we could address, and by describing the remaining impacts. Failure to mention an impact either qualitatively or quantitatively essentially assigns a value of zero to the impact for purposes of the analysis, something which has been avoided.

The goal of this approach is to provide government decision-makers with enough information for them to make a balanced decision between qualitative and quantitative uses.

Perhaps the biggest problems with preparing economic analyses for estuarine sanctuaries are time and money. At Apalachicola, and I fear at most sites, little time or money was allocated for analyzing the economic impacts of the sanctuary, yet at the same time, a product able to withstand public scrutiny was expected.

Needed Research at Established Sanctuaries

Based on our efforts, I'd like to pose some economic research questions to those with experience in existing sanctuaries. If answered, future economic evaluations for proposed sanctuaries could be simplified and sanctuary managers could better understand the impact of their sanctuary on the local and regional economy.

- 1) What have been the impacts on property values adjacent to established estuarine sanctuaries?
- 2) Have there been any noticeable changes in the volume of tourist activity since the establishment of the sanctuary?
- 3) How extensively have established sanctuaries been used by high schools and universities for educational purposes?
- 4) Has the establishment of a sanctuary caused any noticeable changes in the public and private uses of natural resources in the sanctuary area?
- 5) Has the sanctuary created any "spin-off" industries such as tours to the sanctuary?

In conclusion, I'd like to stress the importance of understanding the economic tradeoffs from a specific sanctuary designation prior to presenting the management program to the general public. I'd recommend that all sanctuary proposals and environmental impact statements be developed by a multi-disciplinary team which includes one member with expertise in economic analysis, who can relate and evaluate economic concerns with environmental concerns.

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THE APALACHICOLA NATIONAL ESTUARINE SANCTUARY PROPOSAL:
LOCAL PERSPECTIVE IN RESOURCE MANAGEMENT

Edwin J. Conklin¹

Abstract

The Apalachicola River Basin represents a resource of extraordinary biological richness, productivity, and economic value. The Apalachicola Bay estuary, formed at the mouth of the river by a barrier island chain, produces almost 90 percent of Florida's oysters, as well as numerous other shellfish and finfish. The proposed estuarine sanctuary would encompass much of this system.

Florida's institutional setting provides for a strong local role in natural resource management. In addition, the fragmented state agency system requires a coordinative mechanism for effective conflict resolution and unification of program goals.

The river basin community is predominately rural, enjoying an almost symbiotic relationship between the people and the environment. Community leaders in the river basin are a powerful force and can be utilized as effective contacts for program managers. Front-end cooperation between local government and state agencies helped resolve potential conflicts and shaped the management plan for the sanctuary.

The Apalachicola proposal is an example of how diverse interests can be served in a multiple-use system. As such, it may be a model for future estuarine sanctuaries.

Introduction

The Apalachicola River and Bay Sanctuary, was designated by the Office of Coastal Zone Management as the nation's sixth estuarine sanctuary. In excess of 190,000 acres, the Apalachicola is larger than combined area of all other sanctuaries.

In addition to its' size, the proposal is perhaps the most complex coordinative venture undertaken as a sanctuary, as well as the most controversial. To understand the local viewpoint and interest, it is

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necessary to discuss the river basin as a whole; to examine the interaction between forces that have debated the sanctuary proposal.

The Environmental Setting

The drainage system terminating with the Apalachicola River and Bay is located in three states (Florida, Georgia, Alabama) and is formed by three major rivers (Chattahoochee, Flint, and Apalachicola). In Florida, the Apalachicola has the largest rate of flow in the state, averaging in excess of 23,000 cubic feet/second (Livingston, 1976). The river floodplain is vast, and as yet, sparsely populated with limited development. The annual flooding of the river is a major contributor to the high biological diversity and productivity of the estuary.

There are 116 species of noteworthy plants in the immediate vicinity of the Apalachicola, of which 17 are endangered, 28 threatened and 30 rare (Clewell, 1976). In addition, the fauna of terrestrial vertebrates, including amphibians, reptiles, birds, and mammals is diverse, totalling over 250 species. The Apalachicola is said to be as biologically distinctive as the Everglades, but it is much less well known (Means, 1976).

The biological system of the Apalachicola Bay estuary, formed at the mouth of the river by a barrier island system, is dominated physically by fluctuations of the river. Evidence shows that the high degree of productivity of the bay is tied to the quality and quantity of the river (Livingston, 1976). The estuarine sanctuary boundaries encompass all of the bay, most of the barrier islands, and the lower twenty miles of the river. Much of the wetlands and floodplain bordering the bay and lower river are also included.

Florida's Institutional Setting

Two diverse factors in Florida have had considerable influence on development of the Apalachicola Sanctuary Program; the legal emphasis on the local role in land use, and the fragmented management of natural resources at the state level. The so-called "quiet revolution" of the 70's in Florida, culminating in the Environmental Land and Water Management Act (Chapter 380) and the Local Government Comprehensive Planning Act (Chapter 163) mandated a process for management of local resources and resources of special statewide concern.

The State only prescribes a process, and implementation is left to local government. For example, in a designated "Area of Critical State Concern", principles for guiding development are formulated by the state land planning agency. They look to county commissions to institute regulations to protect the resource. In addition, local governments are directed to develop comprehensive plans, including elements for conservation, land use, and coastal zone management. Although the State reviews the plans, they generally cannot force modifications or compliance through their comments. Because of this emphasis on local autonomy, effective management of natural resources depends on close coordination and cooperation between local government and state authorities.

Fragmented state natural resource authority complicated the sanctuary designation process. For example, the Department of Natural Resources (DNR) manages marine resources, state land purchases and parks, and will ultimately be responsible for the sanctuary. The preliminary proposal, however, was developed by the state coastal management agency in the Department of Environmental Regulation (DER). In addition, the Apalachicola Resource Management and Planning Program, as part of the designation process for Areas of Critical State Concern, is managed by the Department of Community Affairs (DCA). The Apalachicola River Basin Committee was formed to guide the program. The committee has acted as an effective mechanism for conflict resolution between local government interests and the state.

DCA, as the successor to the Division of State Planning, is also attempting to coordinate state and federal programs in the basin as part of an overall management plan (Florida Department of Administration, 1977). Emphasis is on cooperation and communication between all parties with programs in the area. The sanctuary is perceived as an especially important vehicle for resource management and long-term protection for the living resources of the bay and lower river.

Navigation

The Apalachicola is the lower end of a maintained navigation corridor which links the Gulf of Mexico with the Chattahoochee and Flint Rivers to the north. Those rivers are already heavily dammed, while the Apalachicola remains relatively unaltered. The so-called Tri-Rivers system has been used for commercial transportation since the 19th century, but only in recent years has it been altered by dams, dikes, and other structures.

Georgia and Alabama, occasionally joined by some upriver counties in Florida, have viewed the Apalachicola as the weak link in the navigation and industrial development chain. For many years, barge interests have promoted public works projects that would significantly alter the free-flowing nature of the river; making it safer and more reliable for commercial traffic. Florida has remained generally opposed to proposals to alter the river and has supported its protection.

In fact, the state has already spent about \$22,000,000 on public purchases in the area through its Environmentally Endangered Lands (EEL), and parks programs. Despite statements to the contrary, the sanctuary is seen by some as another effort by Florida to curtail and perhaps even eliminate navigation. This issue was of significant concern to local governments in the basin as well, involving regional economic and environmental issues.

Georgia and Alabama raised vigorous objections during the sanctuary draft EIS process. The governors of the three states met in August, 1979 to attempt to resolve differences over this question. Florida was asked to provide assurances that it will not use a sanctuary designation to impede navigation,

The Sanctuary and Local Conflict Resolution

Navigation proposals and land development activities in the basin have been a point of controversy for several years. These proposals threaten the traditional economic and social structure of river basin communities. For the most part, the basin economy is tied to natural resources and the land. Major economic activities are coastal fisheries, forestry, agriculture, beekeeping, and outdoor recreation.

The sanctuary proposal intensified the debate over significant issues that many thought had been decided. For example, the upriver Florida counties of Jackson, Gadsden, and Liberty had, until recently, been lined up against the lower counties of Calhoun, Gulf, and Franklin on the issue of navigational improvements. Upriver counties tended to favor barge traffic and the industrialization and jobs it might bring, while the counties along the lower river were afraid that the river would be permanently harmed by such action. Solving this issue was one of the first tasks of the Apalachicola River Basin Committee after it formed in 1977. After numerous meetings over several months, the counties agreed to pass resolutions opposing major structural alterations to the Apalachicola. In addition, land development objectives were formulated that increased resource protection on the river and floodplain, while promoting compatible economic development.

The state had been working on a preliminary sanctuary proposal for several years, concurrent with the work of the committee. Given the continuing controversy over navigation and development within the basin, emphasis was placed on close coordination with local government and the state program manager. Of all the river counties' economy, Franklin's is most closely tied to the natural resources of the river and bay. Ninety percent of Florida's oyster crop is produced in greater Apalachicola Bay, with a retail value of between \$7,000,000 and \$8,000,000 (Whitfield & Beaumariage, 1976). Over half of the county's income is derived from oystering and most of the rest comes from some facet of the seafood industry. The county's approval was also critical to the success of the sanctuary as almost all of the 190,000 acres proposed for inclusion would be within the boundaries of the county.

The seafood trade is a highly individualistic, labor intensive enterprise in Franklin County. People generally oppose change and community cohesion is most apparent during times of crisis (Rockwood, 1973). They oppose alterations to the river that would be detrimental to the industry. The county has spent a considerable amount of its meager tax dollars to support environmental research on this question (Robert Howell, personal communication).

Franklin County has an inordinate amount of political influence with state politicians, and has used this power to pass laws, such as those allowing special size limits and seasons on seafood. This influence has sometimes caused resentment among the state regulatory agencies. However, there has been excellent cooperation between the county and the state regarding protection of the Apalachicola River and Bay.

Social custom in the community places high value on personal trust and contact. In addition, the role of the community leader as a spokesman is extremely strong. The state sanctuary coordinator recognized these facts and developed a close working relationship with the county based on mutual cooperation.

There were several major local concerns about a sanctuary. Traditional seafood harvesting could not be impaired by the designation, navigation should be closely monitored but not unduly restricted, and the county must have a voice in the administration of the sanctuary. It was obvious that in order to succeed, the Apalachicola designation had to be more flexible and innovative than past sanctuaries.

First, the state determined that no new regulations or authority would be necessary for sanctuary management. However, a management group would be needed to coordinate the myriad of local, state, and federal interests. The group, to be called the Sanctuary Management Committee (SMC) was first proposed as a six member group. They were to be appointed by Franklin County (representing seafood interests), the county commission, and research and education, and the other three by state environmental agencies. Neither the state nor the county wanted to be a minority on the SMC, so a voting balance was maintained. All parties reasoned that tie votes would not occur, since the objective of the SMC was cooperation and not confrontation.

In addition to discussion concerning the sanctuary committee, details of the preliminary management plans were reviewed jointly by the county and the state. In a scientific symposium designed to develop principles for sanctuary management, Franklin County's Clerk acted as one of the keynote speakers. As a result of this cooperation, there was increased confidence in the ultimate success of the proposal.

Shortly after the scientific symposium in 1978, interest in the proposal increased in the other basin counties. There was concern that intensive agriculture or forestry practices in the floodplain might be further restricted if the sanctuary were established.

Several meetings of the Apalachicola River Basin Committee were held to discuss details of the management plan, possible impacts on land use activities, restrictions on navigation, and future participation of various interest groups on the proposed SMC. As a result, numerous non-voting members were added to this group, and assurances were made regarding many local objections and concerns.

The Apalachicola River Basin Committee had provided an opportunity for state and federal agencies to work closely with representatives of local government. Although unanimous agreement was seldom reached on issues, resolutions of support for the sanctuary were passed by the committee, as well as the Apalachee Regional Planning Council, which represents local governments in Northwest Florida.

At the present time, there is general support for the Apalachicola sanctuary proposal at all levels of Florida government. The effective participation of local government officials and citizens has been and will be an important factor in the continued refinement and ultimate success of the sanctuary.

Summary and Conclusions

- 1) The Apalachicola River Basin represents a resource of extraordinary biological richness, productivity, and economic value.
- 2) Local government has an especially important role in resource management in Florida.
- 3) State environmental responsibilities are fragmented, necessitating a central coordinating committee or group to deal with resources of statewide concern.
- 4) The effect of sanctuary designation on federal activities is misunderstood and needs precise definition.
- 5) The Apalachicola River Basin represents a community where an almost symbiotic relationship exists between people and the natural environment.
- 6) Recognition of local interests and needs is critical to the success of the sanctuary proposal.
- 7) The Apalachicola Estuarine Sanctuary proposal is an unusual example of how local, state, and federal interests can work together, and may provide a model for future sanctuaries in the country.

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SCIENTIFIC RESEARCH

SCIENTIFIC RESEARCH -

SESSION SUMMARY

Richard Weinstein

The panel on research was moderated by Dr. Ted LaRoe. Panelists were Dr. David Klarer, Research Coordinator for the Old Woman Creek Estuarine Sanctuary; Dr. Robert (Skip) Livingston from Florida State University; Bernie Yokel, Director of the Rookery Bay Marine Research Station; Naida Yolen, from Sea Grant, Washington, D.C.; and John Clark from The Conservation Foundation. Each speaker talked briefly, then the session was opened to comments from the audience. The panel and audience kept returning to two main subjects: what an estuarine sanctuary research program should be, and how to attract funding for research.

Dr. LaRoe started by briefly listing a few questions to provide focus during the session. The program needs to address four broad questions about research as it continues to grow and expand:

- 1) How is greater research use of sanctuaries generated?
- 2) How can funding be obtained for research?
- 3) How can research results be applied to coastal zone management?
- 4) What should researchers study in sanctuaries?

Dr. Klarer described some opportunities that site designated as estuarine sanctuaries provide for researchers. They preserve these areas in their natural state. They act as controls for studies done in other, more developed areas. They ensure that long-term studies can be undertaken. On-site staff provides security for equipment. Baseline monitoring that provides background data for researchers may also suggest future studies and detect gradual changes in the environment. Despite the opportunities that sanctuaries provide, according to Dr. Klarer, the researchers still ask, "What about money?" Most sanctuaries have some competitive advantages since they have a laboratory and housing to cut researchers' costs. But the sanctuary staff should assist researchers in finding funding sources, which are scarce. Dr. Klarer recommended that a sanctuary research coordinator be hired, if funding could be found.

Skip Livingston views estuarine sanctuary research from a different perspective. He is in the process of completing eight years of

study of two coastal systems in the Florida Gulf Coast. One of these, Apalachicola, has recently been designated as an estuarine sanctuary. Dr. Livingston's efforts at presenting his research results to show the importance of the area's natural resources to the local public helped focus local support for the sanctuary designation.

Management of any coastal system requires a comprehensive knowledge of how the system works. The acquisition of such knowledge demands teams of scientists working on long-term research. But most research is short-term, six months on the average, and most universities, funding sources, and scientists prefer shorter studies. Money commitment is the answer to getting the necessary long-term research.

The Estuarine Sanctuary Program should devise a method in which all sanctuaries carry on similar research programs -- systems oriented and well-funded -- so we can compare the operation and characteristics of different systems. Dr. Livingston says the results would be extremely powerful in determining how coastal systems operate. Considering that we spend \$100,000,000 on phonograph records in the country, we can afford to investigate how ecological systems work. He concluded by suggesting that perhaps the reason we do not know how these systems work is that the government, scientists, and managers do not want to know.

When results from sanctuary research are available, however, they must be presented to the public. That was the subject to which the next speaker, Bernie Yokel, directed his remarks. The Rookery Bay Marine Laboratory, where Mr. Yokel is director, is adjacent to the Rookery Bay Estuarine Sanctuary in Collier County, Florida. Area residents include many wealthy retired people. In the 1960's, the residents of the county established the Collier County Conservancy which, in response to developmental pressures, helped to acquire the core of the present estuarine sanctuary. Public support was necessary to properly protect wetlands. Mr. Yokel emphasized that the public must be aware of what is being done, why, and, most importantly, what it means to the average citizen. The citizen has to believe that he will benefit by supporting the sanctuary. Good media relations are important in keeping the average citizen informed. Most reporters are not investigative reporters. Therefore, they must be supplied information, and a good rapport should be developed. Those connected with estuarine sanctuaries must attend public meetings and communicate in simple language. Reports should be written in two versions: one for scientists and another for the public. Mr. Yokel stressed that sanctuary scientists should participate in governing boards and advisory boards, either as a member, or as an expert who is requested to comment. Participation provides a spokesman for the environment with a voice in the decision-making process. In addition, the sanctuary staff should be responsive to developments near the sanctuary and to questions people ask. To summarize, three major goals of the Estuarine Sanctuary Program can be identified; to establish sanctuaries, to provide for research, and to convince the public that maintaining the sanctuary is in their own interest.

Naida Yolen represented NOAA's Office of Sea Grant, a potential source of funding for estuarine and marine research. She asserted that the federal Sea Grant Office has no policy on site-specific proposals. Financial support depends on the quality and the merit of the research

proposal, not on its location. Sea Grant is funding many projects in estuaries, though little of it is in the established sanctuaries. The sanctuaries have received no special consideration in competition for grant awards in Sea Grant programs. The directors of state Sea Grant institutions can offer guidelines on preparing a proposal, and can tailor the research design into their programs. Proposals go through a thorough peer review, plus internal review at the national office.

John Clark was the final speaker on the program. His thesis is that specific research elements will gain more interest and support than general or comprehensive planning. Ecosystem community oriented programs, such as the Estuarine Sanctuary Program, will continue to gain support, and soon we will have to expand beyond the original sanctuary format. After we observe the management benefits of the first few sanctuaries, there will be pressure to establish 100 to 200 estuarine sanctuaries. The expanded program should be ecosystem protection oriented, not education and research oriented. But the Estuarine Sanctuary Program must develop a prototypical or model approach to estuarine ecosystems, building on the strong foundation the sanctuary managers and others have established. Building on this scenario, the opportunities for ecosystem research are strong.

After Mr. Clark's presentation, the session was opened to general comments. Dr. Delane Munson objected to John Clark's "model" approach. In response, Mr. Clark defined his use of the word, "model", but then Dr. LaRoe and Dr. Livingston both agreed that no model could be developed in establishing sanctuaries, though similar approaches can be used in the study of estuaries.

Phyllis Faber suggested that the workshop attendees should help to create a lobby to promote estuarine research. The discussion then turned to land acquisition, where various problems were reviewed, including speed of acquisition, the necessity of purchase, and how to decide what areas to buy.

The discussion was turned back to research by a comment from Les Strnad that money for research is more important than money for land. Donald Kinsey, Director of the University of Georgia Marine Laboratory at Sapelo Island, mentioned his research program, stimulating a discussion about the appropriate format for an estuarine sanctuary research program. After comments by Bernie Yokel, Ted LaRoe, and David Klarer, it was concluded that Sapelo Island is the exception because most sanctuaries will not be established where large research institutes already exist. In most cases, the sanctuary manager or research coordinator will solicit research projects, then use the data to produce a product contributing to management of coastal areas.

Dr. Jack Gallagher, who is familiar with the sanctuaries at both Sapelo and Coos Bay, said that there is a definite need to coordinate activities between sanctuaries because they differ greatly. Some out-of-state travel money would be helpful to researchers. Ted LaRoe supported this idea and suggested that the sanctuary managers should have a formal meeting at least once a year as part of establishing and maintaining a strong communication network.

At this point, Colonel Boone, the Assistant Director of Civil Works for Environmental Programs of the U.S. Army Corps of Engineers in Washington, D.C., directed several comments to the workshop. He said that one of the first problems faced in the Corps' activities was deciding values, so that impacts could be assessed. He felt that determining values requires an ongoing monitoring program. But the Corps orients its research to specific problems, not baseline or monitoring research. He suggested that a researcher should not try to sell his research ideas, but should examine the market by determining the research needs of funding sources like the Corps. The Colonel suggested that scientists attend meetings of the Corps' Environmental Advisory Boards to learn about their research needs.

Bill Cox, the Director of the Division of State Lands in the State of Oregon, supported Colonel Boone. Describing himself as a "politician", Mr. Cox said that the National Estuarine Sanctuary Program was to preserve a few representative areas that serve as a tool, providing information to decision-makers. This information allows them to make better decisions, and to create plans and decisions for protecting estuaries within the system of law in each state. It was never intended to be a substitute for land use planning. Based on this premise, a systems approach to the sanctuary system, by setting overall research criteria, should be coordinated nationally. The program cannot rely on universities to undertake and support all the research. There should be a nucleus of money from federal sources, attracting other funding sources to the desired research projects.

JoAnn Chandler, the Acting Director of the Office of Coastal Zone Management's Sanctuary Program Office commented that the Estuarine Sanctuary Program includes three levels of research: establishing the sanctuaries, doing the research, and presenting this data to the decision-makers. She said that we will soon be in a position in which the third level will be feeding back into the first. When Ms. Chandler concluded her comments, discussion followed concerning the extent of this feedback. It was stated that Congress is aware that the program is young, but it will examine how processes have been set up for the management of research and research data. A speaker also suggested that perhaps money should be spent more for management and research and less for land acquisition. In David Klarer's words, "The established sanctuaries are land rich and money poor".

RESEARCH IN ESTUARINE SANCTUARIES

David Klarer¹

I have been asked to present a few thoughts and opinions on research opportunities in estuarine sanctuaries. The opportunities within a sanctuary are many and varied. Old Woman Creek National Estuarine Sanctuary, for example, is the first designated freshwater sanctuary. In fact, the whole concept of a freshwater estuary is new, dating from 1972 (Brant and Herdendorf, 1972). Virtually no work has been conducted on such a system. For example, the effect of a seiche on the chemistry and biology of the estuary is unknown. Opportunities are not the problem. The problem that you and I as sanctuary managers, administrators, and research coordinators face is how to attract research to estuarine areas. It is primarily to this problem that I will address my remarks.

First, we should ask what does the sanctuary program offer to the scientist? The estuarine sanctuary program was established in response to a need to preserve these productive areas. This need was articulated in the 1960's by several major studies, such as the Stratton Commission Report, which revealed that estuaries and other coastal areas are rapidly disappearing. In Ohio, for example, during a 20 year period, 1954-1974, over 65 percent of all coastal wetlands were "developed" (Ohio Coastal Zone Management Program, 1979). This sanctuary program ensures that at least certain representative areas will remain relatively undisturbed.

The pristine naturalness of the sanctuaries is one of the unique features of these areas. Besides providing areas where research can be conducted on unmanipulated ecosystems, the sanctuaries can act as controls in comparative studies with manipulated ecosystems. The importance of such undeveloped areas should not be underestimated. In Ohio, for example there is hardly a mile of coastline that hasn't felt the impact of technology. The protected status of the sanctuary insures that long-term studies can be undertaken with no fear of encroaching development. This status along with a permanent onsite staff provides the security required for the use of in situ monitoring equipment.

The routine monitoring of baseline data can lead to a data bank that either provides a researcher with background data or even suggests

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possible future studies. This long-term survey also enables researchers to detect subtle changes in the environment. Perhaps one of the most celebrated illustrations of the effectiveness of long-term data collection is the detection of the gradual acidification of Swedish lakes (Odén, 1969). The factors just mentioned make sanctuaries ideal research areas. Their usage as such, however, still requires encouragement of the scientific community.

On my tour of universities around the State of Ohio, there was great interest expressed in possible research programs at Old Woman Creek, but one question emerged with alarming regularity -- what about funding? As everyone here is aware, research today is a costly proposition. Much of today's scientific equipment is highly sophisticated and, therefore, very expensive. Living expenses, as no one needs to be reminded, are rising at a rapid pace.

The question then becomes: how can we alleviate these financial barriers? One traditional method is to provide research grants. However, it is my opinion, probably shared by many others, that many States don't have the money readily available to offer grants. A program of providing grants is probably the most common method of generating research, but it is also one of the most expensive due to duplication of equipment and supplies from grant to grant. Funding for near-site accommodations and travel to and from the research area is also required. Excessive travel should be discouraged but near-site accommodations can be very costly. Old Woman Creek is located near a large summer recreational area, and the cost of surrounding accommodations reflects this area's popularity.

In Ohio, we hope to surmount this financial barrier by providing on-site laboratory facilities, including most of the equipment and space necessary to conduct a research program. A large portion of the remaining researcher costs are living accommodations while in the field. We plan to minimize these costs by providing housing. In the future, we also hope to offer small stipends for specific studies.

The academic community must be acquainted with the potential of a newly established estuarine sanctuary and its available facilities. A sanctuary research coordinator should have this responsibility. A major function of this coordinator is the collection of baseline data. The coordinator could use his working knowledge of these data to suggest possible projects to potential investigators. At the same time, the coordinator will be able to alert a researcher to past or current studies in the sanctuary that might be relevant. The coordinator should also assist researchers in a quest for funding. This requires that the coordinator be aware of possible sources of funding, both public and private.

In conclusion, the sanctuaries program has succeeded in preserving undisturbed coastal areas. This naturalness of the sanctuaries makes them attractive to potential researchers. There should be a research coordinator at each sanctuary to maximize the effectiveness of the overall research program. However, there is the problem of funding such research. It is on this problem that we at this workshop should focus our attention.

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RESEARCH, MANAGEMENT, AND THE ESTUARINE SANCTUARY CONCEPT:

WHERE ARE THE TIES THAT BIND?

Robert J. Livingston¹

The relationship of scientific research to resource management has not been well-defined. In fact, research and management are still somewhat distinct with separate, or even conflicting methods of achieving what should be common goals. On the one hand, researchers tend to avoid application of their studies to management initiatives. Management specialists, however, either ignore such results or simply do not have the scientific background to apply research gains to practical problems. By its very nature, the growing necessity for interdisciplinary ecological research efforts has met with resistance from both camps for quite different reasons. Cairns (1979) has recently outlined the "academic blocks" to interdisciplinary research. These blocks stem from a form of ritualistic "tribalism" which exalts in narrow approaches, convoluted jargon, conformity to the acceptance of untested dogma, and an unusual adherence to the "publish or perish" syndrome. These influences tend to minimize the scope and direction of new ideas. Funding agencies tend to be suspicious of research efforts longer than one or two years, with various influential scientist-bureaucrats actually denigrating long-term interdisciplinary field efforts as the inconsequential hobgoblins of inferior minds. Management people tend to think that research should be directed by management goals without any clear view of how such avenues of inquiry can be successfully carried out. Basically, both sides tend to ignore the fact that enlightened management implies comprehensive understanding,

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and that such knowledge is achieved only through rigorous research approaches which are based on the actual functions of the ecological system in question. It follows that management alternatives are defined by scientific principles based on good research. Such obfuscation of meaningful questions hinders a successful interdisciplinary research program, and parenthetically, the execution of enlightened resource management programs.

A Question of Time

While many ecologists recognize the importance of short-term change in ecological systems, the existence of long-term environmental patterns is seldom considered. Admittedly, temporal variability is complex. Cyclic phenomena include diurnal, lunar, seasonal, and supra-annual periodicities. Often, biological progressions are superimposed over one another in a dynamic system of interacting cause and effect events. Because of the multiplicity of controlling factors and the general lack of an adequate control to measure the extent of background variability, there is simply no uniform method to describe or predict natural sequences of events. Thus, the basic problem of environmental variability over time has led to the present somewhat confused situation where, despite a plethora of facts and figures, there are all too few basic ecological principles to guide the development of management programs. It is clear that the present overgeneralization from specific studies reflects confusion rather than understanding.

The temporal aspects of any given study should be placed within the context of the area in question. There are several ways in which this can be done. Macrohabitat features such as climatological factors (temperature, precipitation, river flow, wind) should be evaluated with regard both to absolute extremes and to short and long-term rates of change. The physiography, depth, and water current structure of any given aquatic system should be defined. Microhabitat distribution is also an important feature, and includes substrate type, other diverse components (presence of grassbeds, corals, rocky outcrops, and sediment features are examples), and water quality parameters (salinity, dissolved oxygen, and pH are examples). The source and timing of the major inputs of energy are also important considerations. These in turn lead to questions concerning timed changes in food web phenomena and trophic relationships of various forms. When interpopulation and community characteristics including predator-prey relationships and competition are added to this list, it is apparent that the complexity of coastal systems precludes easy definition. While the above ecological factors are recognized as important, relatively few, if any marine systems have been studied where the key causative agents are understood over a prolonged period. Catastrophic change is generally ignored. In other words, in terms of both interdisciplinary interactions and cycles lasting more than one year, the inherent variability of most marine systems remains unexplained.

Spatial Variability: What Do You Measure?

The basis of this problem, and the central obstacle encountered by the ecologist is the extreme variability of natural phenomena in coastal

systems. This variability encompasses a range from so-called stable systems with little observed change in time to highly erratic systems which seemingly have no fundamental order. Spatial variability depends entirely on the focus of one's interest and its bounds range from a few microns in extent in microbial studies to global dimensions. Considerable confusion could be avoided if investigators tailored their hypotheses to the scope of the area in question and defined such scope through rigorous field analyses. The search for ecologically important driving functions should be based on reducing broad sets of variables. It is difficult to take too much data at the onset of any given program. On the other hand, there should be a constant evaluation of the scope of sampling efforts, lest the "sorcerer's apprentice" mentality take over what should be a thoughtful, inductive approach to the research problem.

The Apalachicola Estuarine Sanctuary

The Apalachicola estuary has been the subject of a long-term (eight-year) multidisciplinary research effort. Various short-term (14-20 month) studies were carried out to determine specific relationships of various estuarine assemblages. These included evaluations of the impact of pesticides (Livingston, 1975) and forestry management (Livingston, 1978) on the Apalachicola estuary. Other analyses were made of the zooplankton, larval fishes, grassbed communities (macrophyte productivity, associated organisms), and feeding habits of the dominant fishes and invertebrates. There were also studies lasting more than four years of pesticide, nutrient, and detritus distributions, sediment and microbiological relationships, phytoplankton productivity, litter-associated assemblages, and benthic infauna. The continuous collection of monthly data for eight years includes various physical-chemical features of the bay and the distribution of epibenthic fishes and invertebrates. These data have been supplemented by a series of field experiments, undertaken since 1974, which elucidate microbial/macrobial relationships, the influence of predation on various populations, and the overall community structure of benthic invertebrates in the Apalachicola estuary. Through analysis of the interactions of various physical-chemical changes, productivity features, including timed influxes of dissolved nutrients, detritus, and leaf matter from riverine wetlands, and biological components of the system, certain functional relationships were established.

On the basis of these data, various state and federal initiatives were set in motion to buy areas of proven ecological significance to the bay system. By identifying the types and origins of leaves washed into the bay, and through additional field experiments, we were able to demonstrate the importance of such detritus and dissolved nutrients to the estuarine food webs. As a result, 28,045 acres of wetland along the lower Apalachicola River were purchased by the State of Florida under the Environmentally Endangered Lands Act (EEL). Portions of the barrier islands, totalling around 4,000 acres, were also purchased. This action was based, in part, on other studies showing the importance of the barrier islands to the estuarine system. Thus, when combined with St. Vincent Island National Wildlife Refuge, key portions of the lower Apalachicola Estuary have been placed in public hands. The scientific data were then presented to federal authorities for use in the consideration of the inclusion of the Apalachicola estuary in the National Estuarine Sanctuary Program. The estuarine sanctuary was established in the fall of 1979

with enough money to purchase around 12,500 acres of critical wetlands surrounding the East Bay nursery, with the EEL land purchases used as matching funds. This move completed a step-by-step effort to control ecologically sensitive parts of the bay system.

In this way, based on established scientific data, a strategic pattern of land purchases was developed to provide the basis for a comprehensive management program. While further data analysis is necessary before such a management program is achieved, the potential for perpetual maintenance of the Apalachicola resource is now a distinct possibility.

Conclusions

Ultimately, scientists will have to work directly with resource managers, local interests, and concerned agencies if comprehensive management programs are to be achieved. Unless more effort is made to fund interdisciplinary long-term research programs run by scientists who are able to do complex, systems-oriented research and to translate their findings into the public domain, we will continue to be wasteful of our very finite resources.

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SOUTH SLOUGH AS A TOOL

Delane A. Munson¹

Implicit in the creation of the Estuarine Sanctuary program is the idea of usefulness; of the sanctuaries created through this program as tools. In this paper, I will discuss various concepts of sanctuaries as tools using the South Slough Estuarine Sanctuary in the Coos Bay Estuary as a model.

To understand more completely the South Slough Sanctuary as a tool, we must look at it as a physical entity and also as an element in the process in which it is expected to be a part.

Physically, the South Slough Sanctuary covers an area of 4400 acres of uplands and about 700 acres of estuarine area, all of which is to be purchased or otherwise placed under suitable sanctuary management control. The 700 acres of estuarine area includes the southern half of the South Slough Estuary, which is a part of the Coos Bay Estuary. The 4400 acres of uplands lie within a total drainage basin area of approximately 26 square miles. What we have is a relatively small, well-defined ecosystem within which lies the sanctuary. The primary management goal is to reduce, or maintain at a minimum, human impacts within the sanctuary, for maintaining the high quality of the estuarine waters is of prime importance.

The intent is to create an undisturbed, minimally impacted area within an ecosystem that represents estuaries of its biogeographical region. Outside the sanctuary, but within the same estuarine system, however, human activities are occurring and will continue to occur. These external forces and their impacts are integral elements in the functioning of the South Slough as they are in every estuarine ecosystem, and it is these forces and their impacts that have been motivation for creating the sanctuary program.

Therefore, the South Slough Sanctuary can be viewed as a measuring device placed in a larger ecosystem, the South Slough. Within the sanctuary, impacts are expected to be minimal so that baseline physical, chemical, and biological processes can be measured and the ecosystem's structural elements responsible for these processes can be monitored. Outside the sanctuary are minimally and moderately impacted areas which can be compared to sanctuary conditions.

Further removed from the sanctuary in Coos Bay are heavily impacted areas, especially the industrial port development area. So one concept of the sanctuary as a tool is that it is a measuring device, a yardstick

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against which other areas can be compared. In the South Slough, a great deal of my effort has been directed toward the formulation of a monitoring and baseline data acquisition program. I have come to believe that developing an understanding of the South Slough, or any other ecosystem, requires long-term monitoring. A well-defined, comprehensive monitoring plan, analyzed at timely intervals, provides valuable information. Yet it is precisely this activity that receives little funding support from resource agencies, and college and university research programs. This area is one in which the Estuarine Sanctuary Program can excel. These long-term ecosystem monitoring needs have been recognized by the National Science Foundation (NSF), as published in the report of a conference held in March 1977, entitled Long-Term Ecological Measurement. NSF has also recognized the value of the sanctuary system concept as evidenced by their proposal to create a series of Experimental Ecological Reserves. The nation-wide estuarine sanctuary system would do well to strive to gather at least some of the needed ecological data already identified.

To understand the South Slough as an element in the decision-making process, we must first examine the process of which it is a part. In Oregon, as in other states, a precarious balance between development and environmental protection exists. The main driving force for development is economics and the main driving force for environmental protection is public good. The regulatory process operates when units of government comment upon or issue permits.

Sanctuaries within the coastal zone management concept will be working most closely with natural resource management agencies. This linkage is most important because it allows sanctuary data to be made available in a process where decision-making related to natural resources occurs. What is the nature of this linkage? One possible linkage is that a sanctuary simply provides an area whereby natural resource agency personnel conduct investigations that will assist them directly. My experience and discussions with natural resource agency personnel in Oregon leads me to believe that there is a series of conceptual levels from which an agency, such as the Oregon Department of Fish and Wildlife, can operate. The lowest level is an anecdotal one, which I have commonly observed in a variety of public participation situations. Typically, a long-time resident will relate an anecdote about some incident he saw 50 years ago which proves or disproves a point being made. The information content at this level is minimal.

The second level I call the observational survey level. Knowledgeable personnel gather qualitative information. Often, it is a presence/absence form of data, not subject to rigorous analysis but of sufficient information content and current enough to warrant further investigation, or at least serious consideration. Some public input is of this type and some agency information is developed this way.

The next higher level is the quantitative survey level. Here, various measurements are taken and counts made. Most agency information is developed in this way. Frequently, such data are gathered from specific sites, and almost always the data are gathered for answering specific questions of immediate importance. This level is a minimal one for effective resource management, but is most frequently used by resource agencies.

The next level I call the investigational research level. This includes the type of work commonly done by college and university researchers, and includes the problem solving and hypothesis testing forms of investigation. Some work of this type is done by agencies but most of their work does not reach this level of sophistication.

The penultimate level I call the taxonomic modelling level. Here, the mathematical treatment of taxonomic survey and investigative research results occurs in an attempt to yield a predictive model. Rarely does agency work reach such a plateau of effort.

The last level I call the functional modelling level. At this level, taxonomic groupings give way to ecological functional groupings in an effort to create a mathematical model that circumvents some of the difficulties found in taxonomic modelling efforts. I am not aware of any such work being undertaken by an agency; it has been confined to recent research at certain universities.

Irrespective of the value of the results generated from any of the levels of effort described above, most natural resource utilization or protection decision-making is based on a few very basic concepts bolstered by appallingly little data.

Therefore, if we view sanctuaries as tools to be used by resource agencies, we cannot expect innovative or long-term focused results. Rather, sanctuary work would be short-term and a product of a constantly changing set of circumstances. Very little interest has been expressed by resource agencies in the case of the South Slough.

A second linkage we can envision would be one in which sanctuaries are tools for university investigations. Most university research areas are set aside specifically for research purposes. As outlined above, we can expect these areas to be the site of a number of conceptual approaches to problem-solving.

But to date, my experience in the South Slough has pinpointed two major problems in this approach. First, some conditions must exist before university participation can be expected. The area must be within a reasonable distance of the campus. Also, minimal facilities must be available. If the distance is too great for daily commuting, reasonable overnight accommodations must be available. Also, some lab and storage space must be available. In the South Slough, we are now in the process of constructing a small lab on the sanctuary. Minimal overnight facilities are now available and funding to expand these accommodations is being sought.

Second, research results are not coupled to the decision-making process. Therefore, the work being done may or may not be useable. I know of several cases where university work was shelved and unused, even though specifically contracted for by a resource agency, because the approach was not suitable. The idea of having universities use the sanctuary as a tool in their research efforts may well result in innovative accomplishments. But the results generated will be highly diverse, depending on the skills, training, and interests of the researchers. Their efforts will produce few if any long-term results. At this point let me

say that these linkages are not mutually exclusive nor are they inappropriate. In the South Slough, we actively seek to have the sanctuary utilized by any appropriate group or individual.

But I think there is a third linkage that we should develop to enhance the sanctuary's participation in coastal management decision-making processes. The common basis for the two linkages first discussed is the development of new information. The South Slough Sanctuary is providing a site to generate new information. But some forms of information are needed for local and regional management decisions, and other information is of national significance. The development of information of national significance can best be accomplished by utilizing the same methodologies to get identical data at the same time from the entire estuarine sanctuary system. What is needed is a common understanding of the information to be gathered and agreement as to the methods to be used. Finally, a systemwide support basis is required. The best decision-making program would be development of a two-part data gathering effort. One part is a systemwide definition of the problems to be attacked, agreement as to the methods to be used and the data to be gathered, agreement as to the time the data is to be gathered, and financial support. The second part is determined by the needs and resources of the sanctuaries involved.

A final tool concept is that of being an educational tool. In the South Slough, the educational program being developed has two parts. The first part is to develop a trail system that can be used by a variety of age and knowledge levels. The purpose of these trails is to teach people about the long-term effects of man's impact on the environment. The trails are also being designed to facilitate the education of visitors about the natural environment and its components. The construction of the trails is expected to be accomplished with the voluntary participation of the local community.

As for the development of management policies, determining management options, and the administration of the sanctuary, training opportunities have been provided. Two master's degrees have already been earned through internships with the sanctuary in the Oregon State University Marine Resource Management program.

Through this sanctuary-as-a-tool approach, the South Slough should be able to fulfill the roles for which it has been created. To some, the ideas expressed here may seem to be stating the obvious. However, the Coastal Zone Management Act of 1972 gave States primary authority to implement their own coastal programs, of which sanctuaries are one element. Each State has its own concerns and methods and, therefore, its approach is likely to be unique. My purpose here has been to discuss the experiences and approaches used by one sanctuary and to point out that exciting and important work needs to be done on a systemwide basis.

PUBLIC EDUCATION

PUBLIC EDUCATION -

SESSION SUMMARY

Carroll Curtis

The panel on education was moderated by Phyllis Faber of the California Coastal Alliance. Panelists were Dr. J. Kevin Sullivan, Director, Chesapeake Bay Center for Environmental Studies (CBCES); Ms. Jeannette Phillips, Coordinator, Sapelo Island National Estuarine Sanctuary; Mr. Charles Milmine, Director, Savannah Science Museum; and Mr. Hans Neuhauser of The Georgia Conservancy, sitting in for John Henneberger, Superintendent, Chattahoochee River National Recreation Area.

Ms. Faber opened the session with a reminder that public education is an integral part of estuarine sanctuary programs. One of the stated purposes of estuarine sanctuaries is to provide a "vehicle for increasing public knowledge and awareness of estuarine systems, their values and benefits to man and nature and the problems that confront them". Sanctuary managers need to design and implement effective environmental education programs to fulfill this purpose. Development of a successful program depends upon the timing, the type of program, the audience to which the program is directed, and the public's perception of the program.

Dr. Kevin Sullivan shared experiences gained in designing and implementing the public education program at CBCES. Adhering the Smithsonian's mandate to foster the "increase and diffusion of knowledge", the CBCES was obligated from the start not only to undertake scientific research, but also to disseminate information obtained from this research to the public. The Center was accepted by the local community because public involvement and education were early activities.

Dr. Sullivan suggested that program developers at sanctuaries examine established education programs at similar facilities and develop objectives that are designed to use the resources of their site. When the program is implemented, the following points should be considered:

- 1) the importance of the physical space where education will take place;
- 2) the audience (school groups, pre-schoolers, family groups, senior citizens);
- 3) staffing (consider volunteers/docents);
- 4) program concepts; and

- 5) alternative approaches for different audiences in different settings.

Programs should be evaluated to determine if objectives are being met. Some conclusions from the CBCES experience include: family programs are successful because of reinforcement and interaction; the novelty of the setting can impair learning; and children seem to learn a little during a short visit.

Ms. Jeannette Phillips discussed techniques for getting "Archie Bunker", the local citizen who doesn't know or doesn't care that the sanctuary is there, involved. She suggested the following outreach techniques:

- 1) become as involved with the affected community as you are with the sanctuary program;
- 2) establish a broad circle of community contacts so as not to be identified with any one element;
- 3) become a school resource;
- 4) find out what interests the people;
- 5) develop advocacy groups by making visitors feel important in your program and in the world -- remember that environmental education is not a science course but rather an everyday event;
- 6) bring in help and expertise to assist; and
- 7) generate publicity.

Mr. Charles Milmine agreed with the points raised by other speakers and added the following observations:

- 1) consider the disorientation problem facing visitors to the facility;
- 2) do not become myopic about your program (stand back and look at your program from other points of view);
- 3) remember that most people who visit the facility are on leisure time and try to take advantage of the "holiday atmosphere"; and
- 4) make goals for the program that are "action oriented" and stimulate people to "actively participate in conserving the quality of their changing environment".

Mr. Milmine next talked about marketing the education program. He felt that the same principles used by private industry apply. The best way to get the community involved, Mr. Milmine believed, is to speak its language. He referred to a "Marketing Mix" and suggested key factors

to be considered for marketing any program. First, design the education program or product for public acceptance. Second, maximize the distribution potential by making the program accessible. Third, understand the price participants are paying - what must people give up to participate in your program? Finally, promotion is important; establish good public relations and utilize the media to publicize your program.

Mr. Hans Neuhauser discussed the application of the carrying capacity concept to analyzing conflicts between protecting resources for research purposes and accomplishing educational goals. Carrying capacity is defined in the context of Estuarine Sanctuaries as the maximum amount of activity that may be sustained indefinitely on a given area without degrading either the activity or the area. The establishment of carrying capacity values depend on three factors: the management objectives for the Sanctuary, the ecological constraints of the resource, and the quality of the activities to be provided.

Mr. Neuhauser also recommended that managers establish carrying capacities through experimentation in a small portion of the Sanctuary. Results should help determine whether selected activities should be expanded or curtailed.

After some general discussion, Ms Faber appointed a subcommittee to develop a set of goals for national estuarine sanctuary education programs. At the end of the workshop, the subcommittee reported back with several recommendations in five topics; general goals of education programs, education recipients, education program type and products, education program promotion, and education program funding.

One recommended general goal was to provide a vehicle for increasing public knowledge and awareness of the complex nature of estuarine systems, their values and benefits to man and nature, and the problems that confront them. A second goal was to provoke public action to protect, preserve, and enhance the quality of the natural resource base for this and future generations. The third goal was to maintain the natural resource base for scientific study.

The subcommittee concluded that estuarine sanctuary education programs should be targeted to a number of recipients, including children and adolescents, adults, decision-makers, decision-influencers, corporate representatives, persons who may have an impact on the sanctuary because they live in the watershed or work at a nearby industry, the press, and key contact persons of the local community. The different requirements of each audience based on their likely interests were also discussed. However, the setting of sanctuaries varies greatly from site to site in both physical and historical terms, and useful generalizations are difficult.

Recommendations on the types of education programs keyed in on several proposals including brochures, escort programs, displays, slide shows, student stewardships, traveling exhibits, and games. The array of opportunities is extensive. Many of the sanctuaries are still establishing their education programs, and the managers viewed these ideas as offering future potential.

Several suggestions were made on promoting an educational program.

The sanctuaries have very few promotional activities. The Nature Conservancy, which has been managing protected areas a longer period of time can provide a model of successes and failures, and also demonstrate ways to most efficiently promote the sanctuary's attributes. Suggestions include:

- 1) promote the sanctuary concept with other government agencies;
- 2) place outdoor displays or poster exhibits in strategic locations;
- 3) consider establishing a "Friends of the Sanctuary" foundation; and
- 4) utilize the news media, including public interest features or radio public service announcements.

To expand sources of funding, the subcommittee concluded that sanctuary managers should:

- 1) actively solicit funds for both general support and specific research and educational projects;
- 2) earmark public dollars;
- 3) earn funds from public activities, perhaps through community projects;
- 4) seek grants; and
- 5) make sure all visitors are aware of major funding sources that subsidize the facility.

Participants were asked to provide written comments on planning considerations, program ideas, and program promotion. Their suggestions are listed below. The value of each suggestion, as part of an educational program, vary from place to place and time to time. The list does include the ideas of many individuals who have been involved with providing a variety of educational opportunities to the public. Planning suggestions include the following:

- 1) be realistic, both in terms of expected results and program development;
- 2) be extremely careful about publicizing the sanctuary, as undisturbed research should be a primary activity;
- 3) on-site education should be limited by research requirements;
- 4) target efforts carefully to achieve maximum success;
- 5) determine the needs of potential user groups;

- 6) identify and work with persons who are most likely to have an impact on the sanctuary;
- 7) consider both on-site and off-site programs;
- 8) include a feedback mechanism and educate the educators through the program;
- 9) learn from other education programs in the area or nation, but do not duplicate efforts of other programs;
- 10) consider transferring education program responsibility to another institution, such as a state Department of Education or Outdoor Education Department; and
- 11) be aware that income producing activities lead to more pressure on resource utilization and to cynicism about the government when funds raised by public contribution are used to "stop development".

Program ideas included the following suggestions:

- 1) Emphasize aspects of cultural and natural heritage associated with the estuary and watershed. For example, a description of the dependence upon estuaries and surrounding marsh and uplands during the Colonial period along the East Coast might be particularly effective.
- 2) Approach users who are unfamiliar with the sanctuary environment in three distinct steps. First, take a sample of the sanctuary environment to the locale and let people experience it in their own surroundings. Second, encourage participation in a structured environmental program at the sanctuary or in a sanctuary-like environment. Finally, follow up these introductory experiences with more intensive and sophisticated activities in the sanctuary.
- 3) Examine the goals and objectives of the National Park Service and state park programs to determine how various aspects of recreation and public education are mixed to obtain successful results.
- 4) Develop "pre-packaged presentations" for a variety of likely audiences.
- 5) Membership in a "Friends of the Sanctuary Program" can be offered following a sanctuary tour for a small fee. The member might receive a newsletter subscription, special arrangements for future visits, and early invitations to upcoming events and programs. "Friends" may be entitled to contribute in areas where the State cannot.
- 6) Establish a "Volunteer in the Sanctuary (VIS)" program to

entice persons to get involved or assist in activities in the sanctuary. The VIS Program can be a learning program for volunteers and provide the sanctuary with additional support services.

- 7) Demonstrate "Estuarine Processes" and "The Ecosystem Concept" through a variety of educational media. Games can be used to foster an understanding of interactions and interdependences among components of the estuary and the surrounding watershed. Tours can serve to point out key features of interest and stimulate increased awareness of the natural surroundings. "Recorders" can be assigned to record plant types, animal types, and community characteristics. A follow-up session should be included to reinforce what participants observed and learned. Poster contests (school or community) help increase the knowledge of individuals preparing entries and increase the awareness of individuals who view the posters. Slide presentations can be developed to describe the ecology of the region and provide linkages between the sanctuary and ecosystem over time and space. Serve meals utilizing products from the sanctuary environment to help improve knowledge and increase interest. Place descriptive displays at all sanctuary access points. Offer the recreational activities which provide insights about the sanctuary environment.
- 8) Plan activity-oriented overnights for school groups and organizations.
- 9) Stimulate high school and college involvement in mock decision-making discussions on issues impacting the sanctuary and the community.
- 10) Combine environmental education with local government education.
- 11) Provide valuable experience to environmental studies students through on-the-job training and program design.
- 12) Associate estuarine sanctuary education programs with coastal zone management programs.

The following ideas about promoting the program were suggested:

- 1) Contribute articles and photographs to area and national magazines, newspapers, trade journals, and professional publications.
- 2) Establish an estuarine sanctuary newsletter.
- 3) Prepare films or documentaries which describe sanctuaries and coastal ecosystems.
- 4) Conduct a regular lecture series for the local community.
- 5) Promotion bears the seeds of our destruction; be cautious to the point of a persecution complex.

PERSPECTIVES ON EDUCATION IN ESTUARINE SANCTUARIES

J. Kevin Sullivan¹
John H. Falk

Introduction

The Chesapeake Bay Center for Environmental Studies (the Center) is an environmental science and education research facility of the Smithsonian Institution. The Center's environmental research program is aimed at developing an understanding of the functioning of an estuarine watershed ecosystem and the effects of man's activities on such a system. Over the past ten years, we have also conducted a variety of educational and out-reach efforts. We would like to use that experience to provide a perspective on the educational use of sanctuaries. Before getting into specifics, we want to provide some background about our educational efforts.

Background

Since our Center is a bureau of the Smithsonian, we have an obligation to conduct education programs within their overall mandate, which is to promote the "increase and diffusion of knowledge among men". These words, from the will of James Smithson, express his notion of the purposes of the Institution. Since then, the word "increase" has been applied to the Institution's research function, while "diffusion" has signified the Institution's obligations to provide for the dissemination of this research. Diffusion is the basis for the Institution's development of museums and public programs. Thus, the dissemination of information has always been perceived as having a broader application than simply publishing technical and scientific papers.

Other educational objectives have been developed which relate to our geographical location, the kinds of research we do, and our view of the role we should play within our local community. The Center is located on Chesapeake Bay approximately 40 miles from both Washington and Baltimore. It was established in 1965 by the acquisition, through bequest, of a 300-acre farm on the Rhode River, a sub-estuary of the bay. Over the ensuing eight years, the Institution sought to increase its

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landholdings and protect much of the shoreline and headwaters of Rhode River in a relatively natural state. While the Institution was successful in acquiring about 2600 acres, the appearance of such a large tract under quasi-public ownership was a source of considerable concern, and often suspicion, within our local area. Local residents wanted to know why such a large land area was needed, what went on at the Center, and what those scientists were doing with strange looking equipment. To respond to these concerns, we felt it necessary to develop a sense of community awareness and involvement in our programs. This notion has directed many of our education efforts.

Much of our environmental research is concerned with the effects of contemporary and past land use practices and patterns on an ecosystem. Our watershed program is designed to relate the pattern of land use in a watershed to changes on downstream estuarine receiving waters. When we first began to consider such a research effort, we received some useful advice from Luna Leopold and Anne Strong from the University of Pennsylvania who had just completed a land use plan for the Brandywine Basin. They argued that if our research program might potentially have significance to land use and water quality decisions, then it would behoove us to develop working relationships with local, state, and federal officials who had the responsibility for making such decisions and, more importantly, with the general public who might be affected. Strong and Leopold argued that the Center adopt an active public involvement program; we have attempted to follow their advice. The content of our educational efforts has also been influenced by the nature of the watershed estuarine system we are studying. Thus, we have attempted to focus on how an estuary and its watershed interreact, rather than on particular species or habitats.

In summary, we see ourselves as having a relatively broad educational mandate which goes beyond the scientific tradition of publishing professional papers as the principal manner of information dissemination. We feel we have obligations towards our local community to ensure that the general public has an awareness of what we do and why we do it. We also feel that we should seek to understand the social, economic, and political consequence of our environmental research efforts. We have not achieved all of our goals, but we have learned a great deal over the last ten years in developing the kinds of programs best-suited to the particular advantages and constraints of our site and organization. We would like to share these with you.

Developing an Education Program

There are thousands of site-oriented outdoor education programs in the United States. These are conducted at nature study centers, camps, national and state parks and forests, and the like. Generally, these programs disseminate descriptive information on natural processes or environmental phenomena that characterize the area. Each program is unique. Scientific research may be carried out at certain sites while others only have educational programs. Some have local constituencies while others are widely publicized and attract visitors from the nation and the world. Some carry out formal interpretive programs, others rely on the hands-on approach. From the standpoint of developing

an educational program, however, the primary issue they each must address is the definition of educational objectives and the target audience.

The educational objectives we have defined often reflect the values of the sponsoring institution and the individuals involved. The educator should be aware of these biases in the process of defining goals. In our case, we have often debated questions such as: Is our overall purpose the somewhat lofty aim of contributing to improving the environmental literacy of the American people? Is it to promote the understanding of the general properties of ecosystems? Might it be to describe the functioning of estuaries and how they relate to their watershed? It has also been suggested that we emphasize the environmental issues affecting estuaries to seek to influence decision-makers in this regard. Another point of view is that we should emphasize developing environmental awareness, especially in young people. All of these are legitimate objectives and, to some extent, each could be carried out with unlimited resources. In our view, the most important consideration for a fledgling education program is the establishment of overall goals with explicit recognition of the values they imply. From these, specific objectives can be formulated taking into consideration the audiences to be reached and the resources necessary to accomplish them.

Implementing Programs

Assuming that general goals and objectives have been established, what about the specifics of carrying out an estuarine sanctuary education program? We have tried a number of programs oriented towards various audiences and we have come to several conclusions about which factors contribute most to helping us meet our objectives at the Center. Without going into considerable detail these can be summarized as follows:

Establishing an Education Area - We had some early difficulties in carving out a site for our educational programs because most of our lands had been previously designated for scientific purposes. We believe it is important, therefore, that an education area be defined very early in the development of a sanctuary, so that subsequent conflicts can be avoided. Definition of educational needs should accompany the designation of an education area. Does the area include those natural features which are illustrative of the cognitive aspects of one's programs? For example, in an estuarine activity, can the principle of fresh water inflow be illustrated? Other factors are also important. Will it need to be accessible by buses as well as autos? Are indoor classroom facilities possible or required? Many of these questions can be answered more easily if the educational objectives and target audiences have been carefully defined.

Reaching the Audience - One audience that most outdoor centers seek to reach is young persons and the most convenient way of doing this has been through schools. In recent years, we have tended to deemphasize our school programs for several reasons. First, our educational research indicates that the standard one-time-only class field trip has limited cognitive value in terms of the concepts most educators hope to get across. School trips do have value, but most students involved can only be expected to become generally familiar with a given site;

difficult or complex ideas are usually not learned. We have been able to maintain a quality school visitation program on modest resources, however, by having teachers, rather than staff, lead school tours. The teacher is required to make a pre-visit and to become actively involved in the program. We provide pre-visit instruction, introduce the teacher to the site, supply all materials necessary for the field trip, and suggest follow-up classroom activities. The classroom teacher serves as the leader during the field trip. In addition to being efficient, this approach encourages a greater amount of post-field trip classroom activity, a reinforcement essential to learning.

Recognizing the limitations of the school field trip, we have attempted to reach different audiences such as pre-schoolers, out-of-school voluntary groups, and family units. Pre-schoolers should receive more consideration as an audience for outdoor education programs. We have found that if simplified concepts are emphasized, and if one or both parents accompany the child and share in the educational experience, then both children and parent learn a great deal. Another effective, although somewhat more costly approach, is to reach out to a particular audience rather than having them come to you. We have found that conducting programs in neighborhoods and communities using everyday settings to illustrate our points is a highly effective educational tool. A trip to our Center introduces individuals to a new or novel setting which tends to distract them from the educational value of the visit. Our evaluation studies suggest that the same program, conducted in a local area and using local environments, accomplishes more in terms of educational objectives. Similarly, if a body of information has potential political significance, it would have greater impact if presentations were targeted to specific audiences such as visiting legislators, Junior Chamber of Commerce members, selected government officials, and the like.

There are relatively few models for relating outdoor programs to adults. One thing we do know is that hands-on or participatory activities are popular with some adults and should be considered along with formal and traditional educational methods. However, many adults shy away from participatory activities for a number of reasons, as literature on the psychology of small groups attests.

One consideration in working with adults involves recognizing the differences between the typical touring public and local community residents. The visiting adult to most outdoor centers tends to be reasonably well-informed and somewhat sophisticated relative to the general population. However, this may not be the case for most members of the local community. When working to improve their awareness, one must interact with groups such as senior citizens and the rural poor, whose interest and general level of knowledge are relatively low. Reaching these persons will obviously require fundamentally different techniques. For example, explaining to a nearby farmer why you are studying the environment impacts of herbicides is a little bit different from discussing the general properties of estuaries with the local chapter of the Audubon Society.

Staffing - It became obvious to us some time ago that it would not be possible to develop an education staff of sufficient size to completely serve the potential demand for visitation to our Center. In ad-

dition, we found that it was not possible to expect heavy involvement on the part of our scientists in our education programs. To help solve this problem, we have developed a staff of docents or volunteers who handle many of our programs. There are a surprisingly large number of individuals who have the interest and time to be involved a few hours a week in these programs. Of course, the use of these individuals is not without special problems, and a docent coordinator is required. Also, volunteers cannot be considered a complete substitute for a well-trained, core professional staff.

Although not directly related to staffing, the problem of defining the role of environmental scientists in an education program should be addressed. Even with a trained education staff, there will be many instances where the knowledge of a scientist working at the site will be an important component of certain educational programs. The scientist can not only assist in highly technical presentations, but also support an environmental education professional or volunteer who is uncomfortable in presenting a certain body of information. An equitable balance for scientists between these demands to support the education program, while also conducting research programs, is important.

Content - The content of education programs involves factors too numerous to be considered here. We would like to point out, however, that many of these involve "quantity versus quality" issues. In our case, since much of our work concerns relationships between an estuary and its watershed, we want a main topic in our education program to address how this type of system functions. This goal requires that we first define and describe a watershed and an estuary, and this is impossible within the constraints of, say, a school field trip. On the other hand, it would certainly be feasible if we were working with high school science groups over the course of a school year. The content of a given program, therefore, is strongly influenced by its audience and the length of their visitation.

Evaluation - Most educators, particularly those at outdoor learning centers, are occasionally frustrated by the questions "What have I accomplished?" and "Are my programs meeting their stated objectives?" For this reason, we have introduced an active program of research and evaluation and, in fact, a good many of our current education programs have been designed to accomplish primarily research objectives. Thus, our pre-school program was originally designed to develop those kinds of programs which would be of educational value to pre-schoolers in general rather than to serve the educational needs of pre-schoolers and their parents. We feel that evaluation is a vital part of any program even though few outdoor centers will opt to order their priorities to permit education research. Evaluation tools and techniques are available that can be administered easily by lay persons. Nearby academic institutions are often interested in helping to do this kind of work. Another less formal way of achieving evaluation is to share experiences with other institutions involved in outdoor education. This exchange certainly should be one aspect of interaction among sanctuary managers.

Summary

In this brief paper, we have attempted to indicate some of the institutional and site-related factors which have affected the development of our education programs. These have caused us to focus our broad educational mandate on estuaries and their watershed. Also, because of the relevance of some of our environmental research to real-world issues, and our community setting, we feel it is important that our education program includes public awareness and involvement. These guiding principles may not be applicable to other estuarine education sites, but they seem to work well for us.

A large portion of our current education efforts are oriented towards program evaluation and research. The results of this work has helped us to better understand some of the strengths and weaknesses of our programs, and to make improvements. We have concluded that a variety of approaches are necessary to achieve our educational objectives. Certainly, no single program can successfully achieve all these objectives. As time goes on, we would be very interested in exchanging our experiences with our colleagues in other estuarine and marine education programs and we hope that such a mechanism can be developed as a result of this workshop.

COMBATTING PUBLIC APATHY

Jeannette H. Phillips¹

Those of us involved with the public visitation program for the Sapelo Island National Estuarine Sancatury are always impressed with the caliber of our average visitor. He is usually well-informed about, or at least interested in, some aspect of barrier island ecology and history; he cheerfully braves the elements and the primitive quality of Sapelo Island travel; he often is able to share some of his knowledge with us. This kind of visitor certainly makes our jobs pleasant and enriching.

I feel that these visitors would educate themselves about estuarine and coastal systems even if the program did not exist. They will probably make informed resource use decisions and will support conservation/preservation projects. But for every person who seeks out experiences in the environment, such as visiting Sapelo Island, there are many more people who do not know that such opportunities exist. Worse, many do not know they need to be better informed about their environment. How do we reach the person who pitches empty beer cans while driving his truck down the road; who runs his dirt bike up and down the dunes; who,

¹ Coordinator, Sapelo Island National Estuarine Sanctuary.

even if he knew what an estuary was, would see the area as important only if it directly served his economic or recreational needs?

It is no easy matter to change attitudes and overcome prejudices, but estuarine staff members can combat indifference and ignorance among the public by making themselves and their programs accessible. The sanctuary staff must see themselves as an integral part of their community. This is difficult at times because a major effort is required to remind the public that a remote site, such as the Sapelo Sanctuary, is actively operating.

Community ties can be pursued in a number of ways. Service organizations are always looking for speakers; especially people with good slide or other audio-visual presentations. Get to know the local government officials; their support was necessary to establish the sanctuary in the first place, and without their continuing support, the sanctuary may get little or no attention. Make a listing of all the organizations and interest groups whose aims may coincide with those of the estuarine sanctuary. Contact these groups to inform them about the program.

Do not align yourself with a narrow range of interests or one end of a political spectrum when making community contacts. If the sanctuary program becomes too closely associated with one set of interests, other people can be turned off automatically. "Natural" areas set aside for conservation or preservation purposes can quickly become grist for the political mill if an aspiring politician opposes such programs and spies a weak spot in the program. Broad-based community support can protect you from these types of attacks.

Schools are also an invaluable community contact. They can work for you and you can be a tremendous resource for them. Talk to the top administrators first, but also find out who really has input into the curriculum, and who communicates with the teachers. Until you pinpoint the key people, you will spend many hours in meetings with administrators or instructors who seem politely interested but from whom you never hear again. Find out what policies the school districts near you have regarding field trips, and try to plan programs within budgetary or procedural constraints. In our area, few schools furnish bus transport for field trips -- most students must travel by private car or pay for the bus costs themselves. We find that having parents bring students on field trips is a distinct advantage, because it exposes the adults to our programs and provides a more desirable adult to child ratio.

If school field trips are impossible, take the sanctuary to the students. This approach is also a good initial step, even for more mobile classes. Techniques that work in the classroom include illustrated talks, demonstrations, or mobile exhibits. Children love anything that is alive or appears to have lived recently. We were surprised at the enthusiasm that greeted our discussion of salt marsh plants. We had enough plant samples to pass out among the students and they examined the leaf patterns, tasted the salt crystals, and even chewed the stems of Spartina alterniflora plants.

No matter what strategies you devise or programs you put together, you can be more effective if you multiply your efforts through the ef-

forts of others. If you are connected with a government agency you may be able to get assistance from special labor pools. Our sanctuary program has used selected Young Adult Conservation Corps (YACC) enrollees to augment paid staff interpretive work. Other possible reserves of labor are YCC and CETA programs.

If possible, assemble a volunteer advocacy: a "friends of the sanctuary" group to provide broad-based community input to the program and to spread information about the sanctuary throughout the community.

The schools, again, can be of great help in maximizing your efforts. Interested teachers can help you design your public education program, and can use the sanctuary to further their classroom objectives. Utilize their subject expertise, especially in areas where you are not strong. Students may want to organize a sanctuary-related organization. You can gain additional support for your programs by sponsoring sanctuary-related competitions for local students. Examples of contests include designing a logo for the sanctuary, a photo or poster contest, with all entries displayed prominently in the community, and a literary contest. Encourage science teachers, when possible, to allow their students to develop sanctuary-related projects for science fairs, and give these students opportunities to do their research in the sanctuary. Many schools have vocational education programs that provide services to the community. Explore the possibility of having a woodworking shop prepare route signs and other interpretive aids for the sanctuary -- and take the students around prior to start of work so they can help you plan the project.

This kind of activity among students promotes a feeling of ownership, even among people who are not scientifically or environmentally oriented. The same principles work for the community as a whole: if the public does not feel it has a stake in the estuarine sanctuary, it will be apathetic or hostile toward your program objectives -- or even toward the sanctuary itself. If only the scientific and conservation-minded people in the area are familiar with the sanctuary, and only they use it, other segments of the community will surely resent such an "elitist" facility. Another way to encourage widespread ownership feelings is to plan special days in the sanctuary for people with compatible interests. Some ideas are: a birding day, with experts present to furnish information on species found in the sanctuary; a canoeing day, including a picnic lunch; a special graphic arts day, when people are encouraged to paint, sketch, or photograph; and concerts in the outdoors.

As mentioned earlier in connection with field trips, children's activities always bring a special bonus. If adult chaperones bring their children and participate in the programs, they often come away with new ideas and spread the word.

In order for people to accept an idea, it must relate to something they already know and in which they have an interest. Therefore, any public education effort must get people where they live, and proceed from there. I mean this both literally and figuratively. Don't wait for people to flock to the sanctuary on their own -- they won't. And gear your approaches to what the public is ready to hear, see, and accept. People who are not used to outdoor programs or do not think in ecological or conservationist terms may feel quite uncomfortable at the prospect of

visiting a sanctuary. One teacher, given the opportunity to bring her class to Sapelo Island Estuarine Sanctuary, could not overcome her fear of alligator attack. While this may seem irrational, it nevertheless restrained her and her students from participating in the public visitation program. Fears are real barriers to attitude and behavior changes, and overcoming them is part of combatting public apathy. Many people will need to be encouraged before they become enthusiastic about the sanctuary program. You have to build on what they already know, if anything. This requires perception, planning and knowledge of the community. It's hard work, but if it is successful, your introductory sallies will leave people intrigued and wanting to learn more.

Getting people where they live also means that you may spend much of your public education time outside the sanctuary. Fairs, exhibits, local events -- these all offer good exposure. Coordinative efforts with the local extension service can help you make inroads in the community and give you the opportunity to serve as a resource for extension agents.

Because the Sapelo Sanctuary is so remote, we spend a good deal of time just publicizing it and preparing people to accept the idea of a visit. We have made progress, but still our average visitor is the self-motivated person. The one exception to this is the rapid expansion of our school program. I have been emphasizing school contacts. This is because we have made a major effort to cultivate good relationships with schools, and because these relationships are very important. An uninformed, unprepared teacher can turn the best-conceived environmental experience into disaster. An "enlisted" instructor adds materially to any program, motivates the students, and spreads the word to colleagues.

In summary, I feel that apathy in the community is the result of several factors. It is produced by a lack of ownership feeling -- people thinking they have no stake in what happens in the estuarine sanctuary or to the estuarine sanctuary. As benefits from the sanctuary accrue to a greater number of people, the amount of ownership people feel increases. A related problem is the fear of new experiences or new ideas. Admittedly, an estuarine sanctuary is not likely to be central to many peoples' lives or essential to their existence. You will have to demonstrate that the sanctuary and its programs are a tangible, accessible improvement to their community and an element in a desirable quality of life for the local public.

In order to overcome apathy, ignorance, and perhaps downright hostility, the sanctuary staff need to be a combination of marketing analysts, salesmen, interpreters, politicians, and financial wizards. They must be prepared to go far more than half-way to meet and integrate themselves with their communities. Finally, they must be prepared to accept and welcome the interest and support of their communities when it is offered.

CONSIDER MARKETING SANCTUARIES

Charles E. Milmine¹

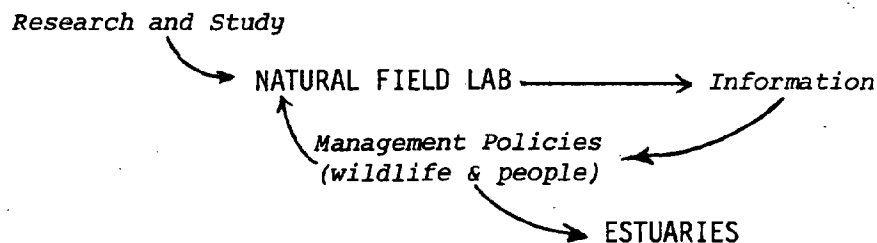
The automobile manufacturer who advertises his product has one objective in mind: he wants you to buy his product. You may not be in a position to buy his product at the moment, but maybe his promotional efforts will make you remember the automobile so at a future time you will buy it. At the very least, he wants to leave you with some facts about the automobile and an appreciation or understanding for the aesthetic qualities of the automobile.

I note that goals of your sanctuaries include the following: you are dedicated to "study and gather data on natural and human processes occurring within the estuaries of the coastal zone".

The Coastal Society, the sponsor of this workshop, has a similar goal: it is dedicated to "promoting knowledge, understanding and wise use of coastal environments".

Of the two goals, I feel that the Society's comes closer to what you should be emphasizing. I suggest you reduce your goal statements to the simple "wise use of coastal environments". The emphasis should be on action. It is difficult for the general public to support organizations dedicated to gathering data, and promoting knowledge and understanding.

The end product of sanctuaries programs is to help develop management policies for all estuaries. The research and study you conduct in your natural field labs will yield information which will lead to management policies for all estuaries. I suggest you concentrate your public education efforts on encouraging public action to implement management policies in coastal environments.



The first step in public education is to know yourselves. This means setting goals that are action-oriented. You may need to go through the steps of public understanding and public awareness before you arrive at action, but your goal is still action. Too often, goals ask that people arrive at fuzzy-wonderful feelings and environmental awareness and

¹ Director, Savannah Science Museum, Inc.

stop short of asking for action. You need action, so be honest about it.

The second step in public education is to know your publics. Think of them in terms of your goals. Are their interests parallel or opposed to yours. Examine the local geographic area for allies and begin to involve them in your goals. Ultimately, you should go after those individuals and organizations opposed to you. Work on reducing their opposition and emphasize the benefits to them of your management programs.

The third step is to examine the exchange process needed in order to achieve the action you ask for. This involves learning all you can about the needs and desires of your publics. You are competing for their attention and ultimately asking them to alter their behavior to act on your goals. You are competing for their time, probably their leisure time. You are asking them to exchange their leisure time to voluntarily act on your goals. At times, you may be asking them to exchange dollars in order that you may act on the goals. At other times, you may be asking them to exchange a work day and income to attend a workshop.

The assumption is that their needs and desires include a need or desire to have wise use of coastal environments. If they hunt or recreate in that environment, public education to support wise management should be tied into these activities. They must realize that for a small investment in time or money they will be able to enjoy those environments more. The exchange must be voluntary and they must feel they benefitted from the exchange.

The fourth step in public education programs is to promote your goals and objectives. Emphasize the goals first and your organization as a means of achieving those goals second. Promotion consists of more than publicity. It involves public relations, selling, and general noise-making. Like the automobile dealer, you want to keep you organization's goals in front of the public at all times so when they want to "buy in" they will think first of you.

The four steps I outline are no more than parts of the market mix used by commerce. I urge you to learn more about marketing tactics and strategies. You can't knock success. You bought a car because some auto manufacturer designed what you felt was a good product, took the time to learn all about you and your desires, priced it properly so that you felt the dollars you exchanged for the car were well-spent, and kept reminding you about his product in the media. Your programs of public education can benefit from using these steps.

ESTABLISHING CARRYING CAPACITIES FOR ESTUARINE SANCTUARIES

Hans Neuhauser¹

The National Estuarine Sanctuary Program establishes overlapping and potentially conflicting goals for each sanctuary to meet. The Congress intended that each sanctuary be a research area ... "set aside to provide scientists and students the opportunity to examine over a period of time the ecological relationships within the area" (Coastal Zone Management Act of 1972, Sect. 304 (7)). The Office of Coastal Zone Management added the requirement that a sanctuary is ... "to provide a vehicle for increasing public knowledge and awareness of the complex nature of estuarine systems, their values and benefits to man and nature, and the problems which confront them" (15 CFR Part 921 (39 Fed. Regist. 108, 6/4/74)). The educational uses of an estuarine sanctuary are a logical outgrowth of the research activities but the uses are not necessarily compatible. A group of school children parading through a salt marsh in a valid educational activity could significantly alter the findings of a scientist intent on determining the standing crop of the same marsh grass. The choice of methods by which research and educational uses are made to complement each other rather than compete is one of the manager's most important decisions. The wrong choice could lead to the degradation of the resources that the sanctuary was established to protect.

Establishing the carrying capacity of the resource is the critical factor in determining the choice of methods. The concept of carrying capacity derives from the ecological literature; for our purposes here it may be defined as the maximum amount of activity that may be sustained indefinitely on a given area without degrading either the activity or the area. An area's carrying capacity is more than its ability to withstand physical destruction. Carrying capacity is based on the long-term integrity of the activity simultaneous with the long-term integrity of the environment at the site of the activity. Activities include more than just physical action such as walking, sampling or measuring. They include teaching and learning, aesthetic enjoyment and the quality of the experience.

Carrying Capacity is not determined by such factors as the number of life jackets on the ferryboat or the number of seats in the auditorium. These constraints serve as tools to help the manager regulate the use of an area at or below its carrying capacity. The tools do not establish the capacity.

¹ The Georgia Conservancy
Discussions with John Henneberger of the National Park Service and Al Ike and Jim Richardson of the University of Georgia have been most valuable in the development of the concepts contained in this paper.

Establishing a carrying capacity value for the sanctuary (actually a set of values, one for each component part of the sanctuary) will help the manager prevent conflicts between users, and prevent overuse. The values will also help the manager withstand demands for excessive or inappropriate use made by politically powerful individuals and groups.

How, then, does a manager go about establishing carrying capacity values? Lime and Stankey (1971) identify three components: the management objectives, the ecological constraints, and the quality of the activity. Each of these need to be determined and the results integrated into a carrying capacity value.

Both the Coastal Zone Management Act and its legislative history give clear precedence to the management objective of establishing and maintaining sanctuaries as research areas. It is thus incumbent on the manager to establish carrying capacity values that give primary consideration to research objectives and then secondary consideration to educational activities. When conflicts do arise between the two, they should be resolved in favor of the research activities.

Ecological constraints vary from sanctuary to sanctuary and within each sanctuary. The manager must recognize that different parts of the sanctuary will react differently to various kinds of activity. Some areas are resilient to human disturbance; others are not. The resiliency may change from season to season as well. A colony of nesting birds creates a vulnerability to an area during the spring that is not present during the rest of the year. These and other constraints must be identified and their limits determined before a carrying capacity value can be established.

The quality of the activity is the most difficult component to measure and yet its accurate determination can be the most critical factor in determining carrying capacity. The management objectives help to determine what that quality should be. Congress declared that Estuarine Sanctuaries were to be ... "natural field laboratories" (Coastal Zone Management Act of 1972, Sect. 315 (1)). This means that research activities should not significantly alter the sanctuary beyond the bounds of what is "natural". Field research involving destructive or grossly manipulative techniques would be contrary to the mandate and thus must be prohibited. Research that depends on an unaltered environment should be encouraged.

Because the resources of each sanctuary are unique and because the manager often does not have the information that would allow him to determine the impacts of different activities, an experimental approach should be adopted. One way to do this, as suggested by Ike and Richardson (1975), is to select a small portion of the sanctuary in which to allow an activity to take place. The portion selected should be much smaller than what might eventually be made available for that activity. If evaluation determines that the activity is compatible with sanctuary objectives in the small experimental area, then the activity can be allowed to expand into other parts of the sanctuary. On the other hand, if the activity is incompatible or creates unnecessary or undesirable risks to the fulfillment of sanctuary objectives, then that activity may be concluded without having done much damage to the resources.

The evaluation, of course, should take place in areas representative of the larger sanctuary and it should be based on the three conditions of fulfilling management objectives, not exceeding ecological constraints and maintaining the quality of the activities central to the sanctuary's purposes.

References

- Lime, D. W. and G. H. Stankey, 1971. Carrying Capacity: Maintaining Outdoor Recreation Quality. Forest Recreation Symposium Proceedings, pp. 174-184.
- Ike, A. F. and J. I. Richardson, 1975. Carrying Capacity for Cumberland Island National Seashore. University of Georgia ICAD, pp. 41.

SUGGESTIONS ON THE DEVELOPMENT OF ESTUARINE SANCTUARY

EDUCATION PROGRAMS

Linda A. Sadler¹

Introduction

With the establishment of each National Estuarine Sanctuary, its manager has a unique opportunity to contribute to conservation and rational usage of the nation's estuaries; those uniquely productive areas where land and water meet. A sanctuary education program can provide citizens with an opportunity to acquire knowledge, skills, values, and attitudes concerning the protection of estuaries. In addition, the education program can aid in the resolution of resource management issues that require a clear understanding of ecological, socio-political, and economic interactions.

Any program that will accomplish the ambitious goals mentioned above will require time, staff, and money. These requirements will vary with each sanctuary. This paper suggests a number of ideas to attain these goals. For some of the newer estuarine sanctuaries, the ideas in this paper may serve as a long-range goals. For others, like Sapelo Island, many of these ideas already have been implemented. Staff assistance to implement these ideas can be obtained through volunteers. Volunteers are likely to be motivated by an opportunity to share their

¹ Federal Office of Coastal Zone Management.

appreciation of estuaries and to encourage others to respect these resources or by an opportunity to learn more themselves. Volunteers also enable a budget to be stretched. There are many people interested in this kind of environmental education who would be willing to help. The federal Office of Coastal Zone Management has developed a list of supporting materials, some of which are listed at the end of this article.

Developing an Education Program

The following steps may be helpful in getting a sound sanctuary education program underway:

- 1) Establish education as a part of the overall sanctuary plan.
 - a) Assign a staff member responsibility for the program. Ideally an interpretative specialist could be hired part-time.
 - b) Allocate a percent of time of any other staff members for use of education.
 - c) Include education as a budget item as soon as possible to get it into budget cycle.

- 2) Establish an estuarine sanctuary education committee.
 - a) Hold a community meeting to identify interested local people.
 - b) Identify gaps in types of people needed: query local principals, teachers, teacher colleges, conservation groups, marine education groups, and local foundations.
 - c) Appoint a chairperson who has a genuine interest in environmental education, who understands the sanctuary program and who has talent for leading group efforts. The chairperson should attend all sanctuary board meetings.
 - d) Appoint members to the estuarine sanctuary education committee who are willing to devote time and have special expertise. It is essential that some members be professional educators.

- 3) Give members of the sanctuary education committee clear instruction on their responsibilities. The tasks of the committee should include several responsibilities.
 - a) Find out what is currently being done by local schools in environmental education and what is needed that could be provided by the sanctuary staff, such as marsh walks, laboratory tours, films, and lessons. The environmental education coordinator at the state Department of Education will probably be a useful resource.
 - b) Identify resources (people, materials, and sources of funds) that could assist in an education program. Personnel assistance may be available from a college work/study or intern program, employment generated by the Comprehensive Employment and Training Act (CETA), or the Youth Adult Conservation Corps and the Youth Conservation Corps. Local groups, such as

- Girl Scouts and Boy Scouts can be encouraged to develop projects within the estuarine sanctuary in conjunction with the sanctuary manager.
- c) Evaluate the applicability and availability of printed and audio-visual materials for use by the general public and the local schools.
 - d) Look to local resource people for assistance. Local government officials and people in water-related occupations may be helpful, including shellfish wardens, members of local conservation commissions, harbor masters, fishermen, and local museum staff. State agencies, such as the following, can be asked for assistance; the Marine Advisory Service, the state Coastal Zone Management Agency, the Department of Fish and Game, and the state Department of Natural Resources. Federal offices that can assist include; the Army Corps of Engineers, the NOAA National Marine Fisheries Service, the National Park Service, the Department of Agriculture's Soil Conservation Service, and the Department of the Interior's Fish and Wildlife Service. Members of the committee may be interested in joining the National Marine Education Association (NMEA). NMEA publishes a quarterly newsletter, called "Currents". Membership in the organization is \$8.00 and can be obtained from NMEA c/o Virginia Institute of Marine Science, Gloucester Point, Virginia 23062.
 - e) Design a realistic coordinated education program to address various groups - primary and secondary schools, youth groups, teachers and youth leaders, and the general public. The program should include information on costs and personnel. The sanctuary education program should identify program objectives, who will participate in each activity, when and where each activity will occur, and budget requirements. A basic education program will require the use of a room, a blackboard, film projector, and handouts. Training of volunteers by experts will help to ensure volunteer participation. The most effective education programs have a clearly identifiable structure and continuity.
 - f) Develop and adopt a written sanctuary education policy as part of the estuarine sanctuary program.

In the long run, I would like to see sanctuary education programs modeled after North Carolina's Coastal Resource Centers, which serve primarily teachers and students, and the National Park Service's interpretive programs which serve the general public. The physical acquisition of estuaries and the availability of funding provides an invaluable educational opportunity.

Selected Educational Materials

"Bibliography on Estuaries/Wetlands". 9 pages, August 1979, free, Office of Coastal Zone Management, NOAA, Washington, D.C. 20235.

"Distribution of Salt Marsh Life" (A teacher's field trip guide). Robert Schroeder and Linda Haughey. Pages 45-50. Sea World. Winter 1977-78. San Diego, California 92191.

"Field Guide Sheet for Southeastern New England Marine Environments - Salt Ponds, Salt Marsh, Tidal Flats, the Sandy Shore and Dunes, Rocky and Man-made Shores". 1978. 2 sides each, \$1 for 5 sets, Cape Cod Cooperative Extension Service, Barnstable, Massachusetts.

"Life and Death of the Salt Marsh". John and Mildred Teal. 274 pages, \$2.95. 1969. Ballantine Books, New York.

"A Tour of Mudflat Town" (elementary level). Judith M. Scarff. 23 pages, 1970. North Carolina Resources Center, Manteo, N.C. 27954.

"Our Nation's Wetlands: An Interagency Task Force Report". 70 pages, 1978. Coordinated by the Council on Environmental Quality. U.S. Government Printing Office, Washington, D.C. 20402. Stock Number 041-011-00045-9.

"Wetlands" (A teacher's guide). Jean MacConnell and Harry H. Dresser, Jr. 43 pages, \$2, College of Education, 206 Shibles Hall, Orono, Maine 04469.

"Billion Dollar Marsh" Secondary, College, Adult. BBC film. 16mm, 26 minutes/color. Rental-\$35. Time-Life Multimedia, Time & Life Bldg. New York, N.Y. 10020.

FUTURE DIRECTIONS

FUTURE DIRECTIONS -

SESSION SUMMARY

Jim MacFarland

The panel on future directions was moderated by Dr. Jeffrey Zinn. Panelists were Shirley Taylor, Chairperson of the Sierra Club's National Coastal Task Force; Milt Martin, from the Department of Ecology, State of Washington; and JoAnn Chandler, Acting Director of the Sanctuary Program Office. Each speaker talked briefly, then the session was opened for comments from the audience.

Shirley Taylor discussed the importance of public involvement in the future of the program. She made several important points about relationships between the public and the program. The sanctuary program needs broad community support. Program staff at the state and national levels must continue to approach participation in a professional manner and respect public involvement. A public participation program may be costly, but it is potentially much more expensive to leave out the public. This professional and positive approach can be reinforced if the staff openly presents the pros and cons of proposed activities. If the public sees through an overt effort at selling a proposed action, then support can be difficult to recapture.

Citizens will participate when they can see tangible issues that are of significance -- and citizens can make a strong, positive contribution when confronted with these issues. Beneficiaries of most proposed actions do not get involved while opposition generally attempts to gather public support. Therefore, one role of the staff is to seek and maintain broad community support by dealing with organizations that represent a variety of interests and viewpoints.

Milt Martin discussed community involvement, and restated several of the points made by Shirley Taylor. He emphasized that working with community leaders representing all points of view is extremely important. The sanctuary program must co-exist with a number of other local programs. When sanctuaries are first proposed, a local committee representing a wide range of interests should be established to inform and provide a vehicle for ongoing communication. (Presentation not included).

JoAnn Chandler viewed the program as having matured since 1972 to a point where major refinements in the program are possible. First, there should be a continuing strong bond between the federal Office of Coastal Zone Management and established sanctuaries. At present, after sanctuaries are established, only periodic reporting maintains the ties between the federal office and states. Second, communication between sanctuaries has been minimal. Possible mechanisms to improve communica-

tion include newsletters, an annual meeting, and other activities that concentrate on common problems. Communication is especially important for issues where assistance from OCZM would be helpful. Third, bonds between state sanctuary programs and state coastal management programs and other state agencies that share common interests should be expanded. Improving these linkages should enhance the viability of the sanctuary within the state.

Chandler also raised several questions about the program.

- 1) Is the \$50,000 ceiling on support for operations appropriate? Should the balance between funding for establishment and funding for maintenance be changed?
- 2) Should funds be made available for research?
- 3) Should pre-application funding be made available before a site is selected?
- 4) Should the federal program encourage non-acquisition methods: can sanctuaries incorporate non-acquired property successfully?
- 5) Should the \$2,000,000 cap on sanctuaries be lifted? Are either fewer but more expensive sanctuaries, or additional and less capitol-intensive sanctuaries more desirable than the present system?
- 6) Should strong linkages between estuarine sanctuaries and marine sanctuaries be created, perhaps including joint sanctuaries?

At the conclusion of the three presentations a number of comments and questions were raised by the audience. These comments represent the diverse views about possible future directions.

Much of the discussion centered on funding. Jenny Phillips suggested the federal office could play a stronger "concerned parent" role by helping States to secure funding. Skip Livingston suggested sanctuary managers identify scientists with active projects in that area. The manager and scientists could form a partnership, giving both increased leverage in securing funding. Livingston reminded the group that sanctuaries are not national parks, and the scientific effort can not be undertaken without support. Another concern about funding was what happens to sanctuaries after the three years of federal funding for the state coastal program. This concern may be partially answered if sanctuaries can be funded for long-term ecosystem baseline research. The audience generally agreed that funding from OCZM should continue beyond the three-year period.

Other comments were reminders about the program's future, based on action and experience in the past. One member of the audience observed that administration of a sanctuary within a state agency familiar with natural area preservation is critical. For example, in Ohio, the Division of Natural Areas, which manages Old Woman Creek, has experience in

managing non-intensive use areas for research and education. A second member stated that all sanctuaries should be considered as part of a nationwide system. Washington is considering a statewide system of estuarine sanctuaries, and this approach might be useful in other states. A third member suggested each sanctuary manager must view his research program using a "systems" approach.

Following the discussion period, attendees were asked to write down their thoughts on two questions; "What are the three most important issues facing the estuarine sanctuary program?, and "Where do you see this program in five or ten years? Many of the topics were raised by several individuals. Some of the comments were new ideas, while others repeated points made during the preceding discussion period. The following ideas on the three most important issues were submitted:

- 1) The relative importance of education and research was mentioned frequently with varying opinions as to which should be emphasized. There was no general consensus. OCZM's policy has allowed individual states to determine which, if any, aspect should be stressed.
- 2) The sanctuary managers need more guidance after the sanctuary is established. This is a relatively new program with no precedents. This has led to frustration for sanctuary managers as they determine their role.
- 3) The topic of research funding was frequently mentioned, especially the lack of funds and the need for OCZM to assist the individual sanctuaries to secure such funding. OCZM's position is well-suited for locating possible funding sources and making appropriate contacts with those agencies in Washington, D. C.
- 4) Stronger state support is needed for estuarine sanctuaries. This means greater recognition of the services estuarine sanctuaries can provide and adequate funding to perform those services.
- 5) Long-term estuarine sanctuary program goals are ambiguous. What is the direction of the program, and who would determine direction -- the States or the federal government? These are two questions that still need to be addressed, six years after the program started? A third question, becoming more important as the number of sanctuaries grows, is how should the sanctuaries be linked?
- 6) More assistance is needed in attracting researchers to estuarine sanctuaries. Why doesn't NOAA encourage Sea Grant research funds to be spent on projects that take advantage of estuarine sanctuaries.
- 7) The program should have a clearer identity to distinguish it from parks and wildlife refuges.

- 8) Concern was expressed about accommodating "people pressure" in estuarine sanctuaries at the expense of the quality of the ecosystem or scientific research. This pressure could lead to a degradation of resources or disruption of research projects.
- 9) Coordination between the state OCZM office and estuarine sanctuaries must be improved. "The interaction at present is virtually non-existent".
- 10) State and local governments, and non-profit land acquisition organizations should become involved in protecting unacquired watersheds.
- 11) Should a sanctuary develop a visitor center, and what are its uses?
- 12) Can the site selection process be improved?
- 13) There must be an improved communications network between sanctuary managers to provide a forum to resolve key or recurring sanctuaries issues.

The following ideas on where the program might be in five or ten years were submitted:

- 1) An estuarine sanctuary should be established in every coastal State, each with strong university ties.
- 2) Estuarine sanctuary research must be strongly integrated into the coastal zone management decisionmaking process.
- 3) Coastal zone management, at both the state and federal levels, should be the leader in estuarine ecosystem research/education and in promoting such information to all sectors of our society.
- 4) A firmly established association of all sanctuaries should be operating to promote information exchange, problem solving, and advice to OCZM on program directions.
- 5) The scientific/education reputation of the program should be firmly established at all levels, including governmental, scientific, and the general public.
- 6) The program should continue to pursue the highest quality sites in an effort to achieve quality rather than quantity.
- 7) One major job of the sanctuary managers is providing an attractive environment for researchers.
- 8) OCZM should coordinate the dissemination of information and actively assist in obtaining research funds.
- 9) Sanctuary programs should be operating in all coastal States, and the system should eventually include 100-200 estuarine sanctuaries.

- 10) A wider variety of approaches to protect designated sanctuary areas will be used.
- 11) The Sanctuary program should be allied with a broader nationwide system of ecological research reserves that encompass major ecosystems in the nation.
- 12) Federal involvement in the program should not be phased-out. This would definitely affect continuity in the program.

FUTURE DIRECTIONS IN ESTUARINE SANCTUARIES

JoAnn L. Chandler¹

First of all, I want to congratulate all of you who have managed to work so hard during three long days. I commend you for your energy. The results of this workshop should be the beginning of a dialogue and debate about new directions in the sanctuary program. How can we build from the communication base that we have established here for the good of each sanctuary individually and for the entire program? It seems important at this point to touch some questions about new directions that I have come up with after these sessions. I hope that we will continue talking about these subjects so that we emerge with some ideas for further action at the end of the workshop.

There are several areas that concern me as the Director of the Sanctuary Program Office. First, I hope we will consider the relationship between the central office and each of the sanctuaries. Are we going to continue with a situation where basically our involvement consists of preacquisition, acquisition, and three operations grants which are used to create a programmatic core that establishes a continuing relation between OCZM and each sanctuary? We have reporting requirements, but, quite frankly, prior to this meeting I was aware of little beyond the reports you have submitted. I think we should begin to think about the nature of the OCZM-sanctuary relationship, and how we might shape it and change it.

Second, we should consider improving intersanctuary relations. What kinds of continuing communication and coordination do you want to have? Is a newsletter desirable? Do you want to have annual meetings? The suggestion of having the first one in Hawaii sounds like a fine idea -- let's say about February. Is personal contact most important? Do we want to emphasize particular subjects of concern? Should we be thinking about any types of standardization? For example, should we begin to think about minimum standards for an educational program? And this ties back into my first concern -- are there things for which the Washington office should formulate guidelines? Do we want to have guidelines for an education program? There may be matters that we in Washington should add as minimal requirements for accomplishing the missions of the program.

¹ Acting Director Sanctuaries Programs Office,
Federal Office of Coastal Zone Management (OCZM).

Third, should we change the relation between a sanctuary and the state Coastal Zone Management Program. As all of you know, the Estuarine Sanctuary Program is a program element of the Coastal Zone Management Act of 1972. Estuarine sanctuaries were intended to provide a natural setting for basic research and educational purposes that provide technical and public support to the overall coastal zone program. We have not yet taken full advantage of this value of the Estuarine Sanctuary Program. There have been substantial environmental achievements under the Coastal Zone Management Act. For example, 23 of the 35 eligible States and territories now have new wetland statutes and regulations, or improved implementation procedures. Sixteen States have special protection measures beyond wetland statutes dealing with endangered plants and animals and twenty States are working in a very positive way to protect beaches, dunes, and barrier islands. There is obviously a community of interest between these special protection measures under the Coastal Zone Management Plans and the concerns of the estuarine sanctuaries.

Fourth, we should begin to think of methods to tie estuarine sanctuaries and coastal zone management closer together. One important link is funding. The Oregon Coastal Zone Program is the first to use that link this year. The management agency for the estuarine sanctuary in Oregon applied for and received Section 306 management funds to help fund the operation of the South Slough Estuarine Sanctuary. This is a most appropriate expenditure of Section 306 funds. It is not an answer to all the funding problems; this source is limited. But, it seems natural to utilize Section 306 management grants for estuarine sanctuaries, particularly when a sanctuary is producing research and education that is useful in meeting the objectives of the overall State Coastal Zone Management Plan.

Fifth, the focus of the Estuarine Sanctuary Program must expand. The establishment of new sanctuaries has been the primary emphasis of the program so far. This is a small program and we have very limited staffing in Washington, D.C. We have established seven very good sanctuaries in five years. Thanks in large part to Jim MacFarland, we have a core of sites and we have a core of good sanctuary managers. We must expand our programmatic emphasis in Washington to meet the research mission and the educational mission of the statute. Since we have seven established sites, should we now think about establishing a system? Does it make sense to talk about a system, and if so, what overriding objectives should that system have?

Commenting on the financial aspect of the program, \$50,000 has been the limit for preacquisition and operations funding. Is that level sensible? Given the limited resources of the program, is the distribution of funds between acquisition and operations appropriate? Should we begin to think about altering that balance? Should we begin to make OCZM funds available for research or for designing research plans?

Finally, I would like to share some thoughts about the establishment process itself. I've heard some good ideas, interesting ideas, and challenging notions over the past few days about sanctuaries; where they should be, what kind of emphasis they should have. We have the regional notion -- emphasizing the region, and the resources in the region, and what kinds of regional needs could be fulfilled by a certain site. Perhaps

we should begin to encourage the use of preacquisition money to fund a regional analysis prior to selecting a site. Perhaps we should encourage States to form a consortium and pool funds to meet the challenge of funding state match for establishing sanctuaries. Perhaps we should begin to focus more on establishing sanctuaries without acquiring the entire site. John Clark of The Conservation Foundation has mentioned 100-200 sites in an estuarine reserve system. I am sure he wasn't talking about buying them all. The program should have non-acquired property, property that may already be in public hands, or in the hands of organizations such as The Nature Conservancy. We need to define the function and role of the national estuarine sanctuary concept when there is no acquisition. On the other hand, when we do have a site that is particularly valuable, should the \$2,000,000 limit on federal match be raised? This might result in fewer, more expensive sanctuaries.

The Sanctuary Program Office is the happy site for the operation of the Marine Sanctuary Program as well. There are possible links between the Estuarine Sanctuary Program, with its emphasis on research and education, and the regulatory function of the Marine Sanctuary Program. Often the estuarine system may be affected by activities occurring in marine areas outside the estuarine sanctuary boundary. While there is no mechanism for the estuarine sanctuary to control such problems, a marine sanctuary might offer complementary and vital protection. The State of New Jersey may propose an estuarine/marine sanctuary combination. The Elkhorn Slough area is another location where the Marine Sanctuary and the Estuarine Sanctuary Programs may complement each other. Over the next few years, we will find out whether the combination can be an important contribution to the success of each.

In closing, I want to thank The Coastal Society and all those who have worked very hard to put this program together. It has been an exciting and informative time. I know that I will continue to benefit from the associations that I've made at these meetings. Thank you.

IMPROVING CITIZEN INVOLVEMENT IN THE NATIONAL
ESTUARINE SANCTUARY PROGRAM

Shirley H. Taylor, Ph.D.¹

"Citizen participation" means different things to different people. Anne Marie and Hans Bleiker (1978) define several views of public participation. "To some it means direct involvement at the local level by the various individuals, groups, corporations, and institutions who constitute 'the public' in the development of plans and the making of decisions that

¹ Chairperson, National Coastal Task Force, Sierra Club; Member, Advisory Committee to Office of Coastal Zone Management, NOAA.

may affect them. To others it means the 'cluttering up' of the problem-solving process that professionals normally use, with the troublesome and, essentially non-contributing involvement of lay people. To still others -- a majority of public officials and professionals... 'citizen participation' has a meaning that falls somewhere between these two extremes."

To improve citizen involvement, resource managers must first have a better understanding of the participation process itself and how to more effectively bring community values into the sanctuary decision-making process. Observers of citizen participation in the 1950's, 60's and 70's have come to some conclusions on how participation works and have developed important insights about what one can expect from the process. The Bleikers (1978) have defined several principles:

- 1) Trust the public. In the end, the public is capable of discerning between needs and demands that are legitimate and those that are not.
- 2) Virtually no big project can get unanimous support of all affected interests.
- 3) The biggest single obstacle to broad citizen participation is citizen apathy. The ones who benefit are least likely to get involved. It is much easier to get the attention -- and involvement -- of those who may be harmed by the project.
- 4) Most lay citizens will not participate in a planning process unless there are tangible issues, they consider the issues significant, and they consider themselves capable of making a contribution.
- 5) Issues that appear perfectly clear to professional staff may not be clear to a layman.
- 6) Public agencies have found that they need citizen participation programs for more important reasons than to be popular. What they must be is respected.
- 7) "Public relations" tactics -- to "sell" the project -- tend to be counter-productive. Citizens assume the agency will give them one-sided information and thus lack credibility with the public.
- 8) Operating a program with an effective citizen participation program is costly -- the only thing costlier is operating a program without an effective involvement program.
- 9) The participation process is part of the product -- of the program produced, and needs to be continued as part of the sanctuary management program.
- 10) Citizen involvement must be structured so that it does influence the way issues are resolved. But it must not be a substitute for decision-making by the agency that has that responsibility.

From this rapid look at what citizen participation is and what it is not, why should you involve citizens? This is not an idle question. First, there is a legal requirement in the Coastal Zone Management Act and Section 921.21 regulations that specify that opportunity for public participation is essential in developing the initial sanctuary proposal and application to the federal government, as well as during, and possibly following the environmental impact statement process. It does not appear that the initial management program phase need involve citizens other than to ensure desirable public access to sanctuary land areas and to the sanctuary research results. However, the regulations do specify (Sect. 921.31) that changes in sanctuary boundaries, management policies (permissible and prohibited uses), and the research program may occur only after public notice, review, and participation.

Beyond this requirement for citizen involvement, the soundness and successful continuation of a sanctuary depends on broad community understanding and support for both the sanctuary location and its program. Now that we, as resource managers, better understand the participation process and recognize the benefits our agency can derive from the process, where do we find this public? There is a whole set of publics that we need to identify before we set up our citizen involvement process.

Who are these publics? We must be sure to contact more than those who already support the sanctuary mission. The citizenry is large and diverse. Public has been identified by Ashbaugh and Sorenson (1976) as:

- 1) all organizations and individuals outside our agency itself;
- 2) all organizations and individuals outside of government;
- 3) all organizations, groups, and individuals serving the "public interest", not economic self-interest; and
- 4) non-profit tax-exempt organizations.

How do we contact these publics? It takes some time, thought, and effort to identify them by name. Some will identify themselves and come forward as a result of mass mailings, attractive articles in newsletters (with mail-in coupons), press releases, editorials, posting public workshop hearing notices, and circulating fact sheets. The agency staff will be able to identify some publics from previous experience.

Ashbaugh and Sorenson (1976) also discuss third-party identification, or snowballing. A group leader lists all the group and individual contacts he knows. Directory research for organizations may also be useful to locate additional names in the geographical area, but these must be used with care since they are frequently out-dated by the time the print is dry and they are often less than complete in their coverage of their subject.

When is our citizen contact list truly representative? Full cross-sectioning is admirable but difficult! Include everyone who wants to respond. Silence may not mean a lack of interest, but rather a lack of information on the part of someone potentially interested. If certain

resource user groups or resource interest groups are silent, solicit their views personally. It's a practical way to avoid problems later, such as charges that they were ignored or victimized.

We need to recognize that different publics need different participatory processes -- some active, some passive (Kaufman, 1978). Active individuals enjoy attending meetings, talking, working, and writing. Press coverage, mailed invitations, and phone calls bring them out. In passive participation, individuals stay involved by staying informed -- through press coverage of meetings, and informative public displays in libraries, public buildings, and shopping areas.

What is the best timing for citizen involvement? It starts before the decisions are made by the agency so that people will spend their time in a meaningful way as they examine and debate alternatives. Equally important in handling the participation process well is the homework done by the resource manager to prepare each step. To plan and decide with the citizens, not for them, understanding public sentiment is important -- identifying the values people attach to the estuary, to the river, to the shore. A program that incorporates this sentiment offers satisfaction, meaning, and identity for the citizens involved in the process as it grows and develops.

From the resource manager's viewpoint, there are five distinct processes in public involvement (Journal of Soil and Water Conservation, 1974):

- 1) Identify the issues and problems that are significant enough to seek public advice and consent on alternatives. Too many public participation programs are begun without ever performing this critical step of clearly separating the restraints -- legal, budgetary, resource capability -- from the alternatives that require input. The questions for debate must be clearly phrased, humanized, and localized for public discussion to be meaningful. Innovative language and colorful fact sheets go a long way to change bureaucratically-phrased, dull sounding concepts into matters that are vital and interesting.
- 2) Collect the full range of citizen inputs, including views from all, by a wide range of activities and means, such as workshops, advisory boards, committees, public meetings, and surveys.
- 3) Analyze the input, summarizing it, reporting its contents, and relating it to public ideas, opinions, and values.
- 4) Evaluate the input, which is necessarily subjective because it requires interpreting the meaning, weighing the implications, and making the decisions.
- 5) Implement the decision, translating it into an action program which includes providing feedback to the public. It is legitimate that the decision be subjected to public review and debate, with agency explanation of the weight given to various factors in reaching the decision. Decisions need to be implemented through effective, efficient action.

The interdependence of these five steps of the participation process is absolute -- the adequacy of each step affects the others as a chain is no stronger than its weakest link. The extent to which the issues were defined by the agency at the outset, the presentation of a reasonable range of feasible alternatives, the identification of probable consequences and trade-offs between alternatives, and the ability to clearly communicate to the public and face public scrutiny are the measures of effective citizen involvement in the sanctuary process. And one must recall that involvement is an ongoing process, sometimes for decision-making, some years as a passive situation of keeping those citizens informed, and again arriving at another round for decision alternatives. Public participation is not like a water spigot, easily turned on or off, but a collection of human interest relationships that require some continuity of agency contact and communication to keep alive for continued use.

Because citizen involvement programs must be so explicit and so visible a part of decision-making at local, regional and national levels, the skillful handling of the process requires real professional skill on the part of the program manager. It is a mistake to assume that the public involvement program is a simple thing to arrange or that it can be handled easily by the newest addition to the staff at no expense to the agency. Instead, both administrators and the public must recognize that participation is as fundamental and necessary a part of resource management decision-making as are the resource inventories themselves.

Recommendations for improvement in the predesignation stages include the following:

- 1) Provide special training² to the entire agency staff involved in conduct of citizen involvement programs.
- 2) Budget adequate funds (10 percent of the total planning, design, and administrative budget of the agency) to implement the participation program effectively.
- 3) Budget adequate staff time to the involvement program, including 50 percent of top management time during major phases.
- 4) Address adequately and publicly all issues raised with regard to sanctuary designation.
- 5) Establish a sense of openness and credibility with the public.

² Such training has been almost non-existent in the past, in spite of the large number of citizen participation programs mandated around the country. A short course is now offered by the Institute for Participatory Planning in Laramie, WY, for public officials on how to develop "constructive and effective citizen participation programs" in the form of one to four day courses; video-taped based training programs for agencies and the IPP handbook "Citizen Participation Handbook for Public Officials and Other Professionals Serving the Public" are available. Contact Anne Marie Bleiker, Box 4068, University Station, Laramie, WY 82071. Telephone: (703) 742-5941.

As sanctuaries around the country have moved from designation into management, problems have become evident that stem from low visibility in state agency structure, lack of adequate state funding, lack of communication with the scientific community, and lack of community understanding of what the sanctuary is. The best available solution to these problems is in the management system of the sanctuary. Rather than the minimum, having a three-person management committee with no advisory committees (as is the case with Rookery Bay), it is probably an advantage to have some individuals from outside serving on that management body. For instance, Apalachicola's management committee will consist of five voting and five advisory (non-voting) members from local government, research scientists, area resource users, state, regional and federal agencies.

Involving public sector representatives to serve on research and education advisory boards serves several good purposes. It helps the sanctuary fulfill its mission, raises its visibility, makes adequate funding more likely, and tends to avoid bureaucratic stalemates and inadequacies. These committees need to be accessible to the public, operating in the sunshine with adequate staffing to keep them doing real work. A "user board" of local interests may also be appropriate.

The final message: improve the quality of staff effort in citizen participation programs, allow time and budget to do the job well, begin early when there are real decisions to make, and build a management plan that guarantees ongoing responsible involvement of citizens, scientist, educators, and government officials.

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APPENDIX A
SANCTUARIES

APPENDIX A

SANCTUARY SUMMARY

This summary sheet for sanctuaries was updated on May 1, 1982 by the Sanctuaries Programs Office in the Federal Office of Coastal Zone Management. Following the summary is a brief description of the seven sanctuaries. The brief descriptions were prepared shortly after the workshop, so many of the research and education activities anticipated at that time may already be underway, and some plans may have changed.

South Slough, Oregon

Location: Coos Bay, Coos County, Oregon
Biogeographic Region: Columbian
Size: 4,476 acres
Initial Grant Date: FY 74
Operations Grant: FY 77, FY 78, FY 79, FY 80, FY 81
Acquisition Status: 82 percent complete
Managed by: Division of State Lands
Manager and
Contact Person: Dr. Delane Munson
South Slough Estuarine Sanctuary
c/o Oregon Institute of Marine Biology
Charleston, OR 97420
(503) 888-9015

Sapelo Island, Georgia

Location: McIntosh County, Georgia
Biogeographic Region: Carolinian
Size: 7,400 acres
Initial Grant Date: FY 75
Operations Grant: FY 78, FY 79, FY 80, FY 82
Acquisition Status: 100 percent complete
Managed by: Department of Natural Resources
Contact Person: Margaret Melton
DNR Coastal Resources
1200 Glynn Avenue
Brunswick, GA 31520
(912) 264-7289

Waimanu, Hawaii

Location: Island/County of Hawaii
Biogeographic Region: Insular
Size: 5,900 acres (347 to be purchased)
Initial Grant Date: FY 76, Supplement FY 78
Operations Grant: Not scheduled at this time
Acquisition Status: 94 percent complete
Managed by: Division of Land and Natural Resources
Contact Person: Richard Poirier
Department of Planning and Economic Development
P.O. Box 2359
Honolulu, HI 96804
(808) 548-4609

Old Woman Creek, Ohio

Location: Erie County, Ohio
Biogeographic Region: Great Lakes
Size: 561 acres
Initial Grant Date: September 1977, Supplement for Operations FY 78
Operations Grant: FY 80, FY 81, FY 82
Acquisition Status: 100 percent complete
Managed by: Department of Natural Resources
Manager: Eugene Wright
Old Woman Creek Estuarine Sanctuary
2005 Cleveland Road, East
Huron, OH 44839
(419) 433-4601
Sanctuary Biologist: Dr. David Klarer
Old Woman Creek Estuarine Sanctuary
2005 Cleveland Road, East
Huron, OH 44839
(419) 433-4601

Rookery Bay, Florida

Location: Collier County, Florida
Biogeographic Region: West Indian
Size: 9,554 acres
Initial Grant Date: September 1977
Operations Grant: FY 78, FY 79, FY 80, FY 81
Acquisition Status: 57 percent complete
Managed by: Florida Department of Natural Resources
Manager: Dr. Kris W. Thoenke
Rookery Bay Estuarine Sanctuary
Florida Dept. of Natural Resources
10 Shell Island Road
Naples, FL 33940
(813) 775-8845

Apalachicola River/Bay, Florida

Location: Franklin County, Florida
Biogeographic Region: Louisianian
Size: 192,758 acres
Initial Grant Date: September 1979
Operations Grant: FY 81, FY 82
Acquisition Status: 94 percent complete
Managed by: Florida Department of Natural Resources
Contact Person: Woodard Miley
Florida Department of Natural Resources
Recreation and Parks
57 Market St.
Apalachicola, FL 32320
(904) 653-8063

Elkhorn Slough, California

Location: Monterey County, California
Biogeographic Region: Californian
Size: 1,510 acres
Initial Grant Date: September 1979
Operations Grant: FY 80, FY 81
Acquisition Status: 66 percent complete
Managed by: California Department of Fish and Game
Contact Person: Kenneth S. Moore
1454 Elkhorn Road
Watsonville, CA 95076
(408) 728-0560

SOUTH SLOUGH ESTUARINE SANCTUARY

Coos Bay, Oregon

Location and Description

The South Slough National Estuarine Sanctuary is located in an isolated arm of Coos Bay, which is the second largest estuary in Oregon. The South Slough Sanctuary became the first national estuarine sanctuary in the United States in January of 1975. The sanctuary includes the upper (southern) half of South Slough and the adjacent lands which contribute to it, constituting the main features of a natural unit. The South Slough area of the Coos Bay Estuary is one of the most undeveloped estuaries within the Columbian Biogeographic Region, even though the largest timber exporting port in the world is located in other parts of the same estuary. The sanctuary, now 90 percent acquired, will consist of 4400 acres of uplands and freshwater marshes and 600 acres of estuarine tidelands.

The South Slough watershed receives heavy rainfall and moderating winds from the Pacific Ocean all year. As a result, it is densely covered with a coastal rainforest containing a variety of upland plants. Sitka Spruce, Western Hemlock, Port Oxford Cedar, and Douglas Fir dominate mature forest areas. However, there is little mature forest in the sanctuary. Here, growth varies from maturing second and third growth timber to young reforestation. Beach Pine, Red Alder, Vine Maple, and Coastal Willow often occur, mixed with younger conifers. A variety of shrubs and bushes crown the perimeter of the slough. Well-developed fringe marshes mark the interface between tidal and upland areas, and the submerged estuary bottom supports extensive eelgrass beds.

Land acquisition began in 1976 when The Nature Conservancy purchased 2000 acres of property. This property was later sold to the State of Oregon, and all future land acquisition tasks were turned over to the Oregon Division of State Lands. A 2600 square foot administration office has been in operation in the sanctuary since 1977, including a small research lab. Future program development includes construction of a series of nature trails, acquisition of the remaining properties, and remodeling of two houses in the sanctuary for a caretakers' cottage and student dormitory, respectively.

Organization and Management

Ownership of sanctuary land is vested in the Oregon State Land Board. The old South Slough Management Task Force, which advised the

State Land Board, has been replaced by the South Slough Estuarine Sanctuary Management Commission. The Director of the Division of State Lands handles administrative services for the sanctuary staff. A sanctuary manager, hired in 1976, oversees the operation and coordination of all activities in the sanctuary.

Research

The research program in South Slough is in the developmental stages. The University of Oregon Institute of Marine Biology is located at Charleston, on South Slough, just north of the sanctuary. Other potential users include the Southwestern Oregon Community College, Teramar (a private field science facility), Oregon Fish Commission, Oregon Wildlife Commission, and Oregon Department of Environmental Quality.

The juxtaposition of developed and undeveloped estuarine areas provides a unique research opportunity. Within the sanctuary, the good water quality due to the protected and preserved nature of South Slough permits the commercial culturing of oysters, while just a short distance away, the effects of dredging, log raft storage, and other intensive timber exporting operations can be studied.

As in the other sanctuaries, appropriate research at this site includes basic studies of the ecosystem, baseline and monitoring measurements to detect changes in natural conditions, and developing criteria for policy and management purposes.

Education

The proposed education program calls for a self-guided nature trail that is in the construction stages. To date, most of the programs that have been run have been part of a class curriculum. There has been some work with high school groups, but most of the activities have been at the university level.

SAPELO ISLAND ESTUARINE SANCTUARY

Sapelo Island, Georgia

Location and Description

Sapelo Island National Estuarine Sanctuary represents the Carolinian Biogeographic Region, which extends from Cape Hatteras south to Cape Canaveral. The sanctuary is located on and adjacent to Sapelo Island, Georgia, the fourth largest of Georgia's barrier islands. The State of Georgia now owns virtually all of this island, which consists of a total of 16,500 acres, 10,900 of which are high ground.

The northern three-quarters of Sapelo Island (appx. 12,000 acres) is managed by the Game and Fish Division of the Georgia Department of Natural Resources as the R. J. Reynolds Wildlife Refuge. The southern end of Sapelo, consisting of about 4,500 acres of high ground and marsh, is on long-term lease to the University of Georgia and serves as the main research facility for the University's Marine Institute. Immediately northeast of Sapelo is Blackbeard Island, owned and managed by the U. S. Department of the Interior as the Blackbeard Island National Wildlife Refuge. To the south of Sapelo, across Doboy Sound, is Wolf Island, owned by the Department of the Interior and managed as the Wolf Island National Wildlife Refuge. The Sapelo and Altamaha rivers constitute the principal freshwater sources for the extensive estuaries lying between these islands and the mainland.

The sanctuary is located in McIntosh County, 7 ½ miles northeast of the city of Darien. Primary access to the sanctuary (as well as to the island) is via boat from the mainland dock at Meridian, an estimated six nautical miles.

Until 1969, the island was under private ownership. That year, the State of Georgia acquired the northern 12,000 acres and created the wildlife refuge. The southern portion, where most of the sanctuary is located, remained privately owned until state acquisition in 1976 and the subsequent sanctuary designation. The estuarine sanctuary extends westward over the salt marsh adjacent to Sapelo Island. The sanctuary is bounded on the west by New Teakettle Creek.

The estuarine system within the sanctuary is that of the Duplin River, a tidal drainage system branching off from Doboy Sound. The watershed for the estuary encompasses 3296 acres, of which 474 acres are covered with water at low tide. The salt marsh vegetation is not extensive in type: over 90 percent is Spartina alterniflora (smooth cordgrass) and approximately 7 percent is Juncus roemerianus. Minor species are Distichlis Spicata and Salicornia spp.

In the higher salt marsh, woody shrubs such as Baccharis halimifolia, Borrichia frutescens, and Iva frutescens are the most common.

The upland forest is characterized by plantation and natural growth pine stands (loblolly and slash pine) and by climax live oak communities. There are two domestic pecan orchards. The semi-arid zone west of the beach dunes is characterized by Myrica cerifera, various grasses and forbs, such as Muhlenbergia and Carex spp. as well as invading prickly pear cactus (Opuntia spp.). There are a few fresh-water stands where cattails grow.

Dominant beach vegetation is Uniola paniculata, Iva imbricata, Panicum amarum, and Spartina patens. Since the removal of a substantial grazing cattle population (2000 head) during the last 25 years, this vegetation has had a chance to establish itself and allow development of a primary dune system, and subsequently an interdune meadow and line of stable dunes to the west.

Organization and Management

Responsibility for operating the public education and monitoring programs, as well as for administering the estuarine sanctuary grant, rests with the sanctuary coordinator. The coordinator is a member of Coastal Resources Division staff and works in Brunswick, Georgia at division headquarters. Brunswick is located about 25 miles southwest of the sanctuary. Limited public access to Sapelo Island and extremely limited facilities (space, equipment, and communications) on the island dictated the location of the main sanctuary operations in Brunswick. Because large numbers of people cannot be accommodated in the public visitation program at the sanctuary itself, much emphasis is placed on offering a variety of sanctuary-related educational activities on the mainland in or near Brunswick.

Research

All of the research presently being conducted within the sanctuary is done under the aegis of the Marine Institute. For the past 25 years, this research has focused on the values and natural processes of the salt marsh. It has had a vital role in shaping governmental policy and public opinion about the need for coastal marshland protection. Studies have explored such matters as insecticide impact on the marsh plants and animals, nitrogen flux, carbon isotope ratio tracing of carbon flux, social and feeding behavior of Uca pugnator, and the role of various algae in salt marsh systems.

Monitoring of the sanctuary has not been heavily emphasized so far, but in the future, samples of water quality, and nektonic and benthic organisms will be taken more frequently. Plant and soil samples are taken twice yearly; once in the spring when the marsh is beginning its productive period, and once in the fall as the dormant phase sets in. Counts of animal organisms are also taken at the sample sites.

Under its recently-hired director, the Marine Institute staff plans a shift in emphasis from salt marsh to nearshore research. Investigators will look at interactions of organisms found in the first several miles offshore and their relationship to the adjacent estuary.

Education

Public education is the primary thrust of the Sapelo program. Two regularly scheduled half-day visits to the sanctuary are conducted each week; groups may arrange additional tours as time and staff availability permit. These trips feature a marsh walk, beach walk, review of resource management activities in the sanctuary portion of the wildlife refuge, and a trip to the Marine Institute laboratory display area.

Two new exhibit centers are being developed. One, located at the Marine Institute, will focus on the natural history and geography of the island, with emphasis on estuarine processes. The exhibit will also highlight past and current research performed at the Marine Institute. Under construction also is a waiting room/exhibit center at the mainland dock, which will house a broader range of displays, from human history of the island (most of which took place in the area now encompassed by the estuarine sanctuary), to vegetation, animal life, and tidal marsh information. Prior to departing for the sanctuary, visitors will receive a short audio-visual orientation presented by a member of the sanctuary staff. They will have time to look over the exhibits either prior to their departure or after they return.

Mainland public education efforts range from giving presentations to local groups and organizations to working with instructors in designing appropriate coastal education programs for their students. Coastal Resources Division headquarters includes an exhibit area housing several aquaria and coastal displays. This serves as the focus for flexible short programs offered to school and youth groups upon request.

Public education also involves publicity about these programs through bimonthly articles in a department newsletter, which reaches many coastal residents, and an evaluation effort to assess future needs and aspects of the program that could be improved.

WAIMANU ESTUARINE SANCTUARY

Island of Hawaii

Location and Description

The Waimanu Valley is located on the northeastern coast of the island of Hawaii, encompassing some 3,700 acres of unspoiled forests and wetlands. The sanctuary is characteristic of the Insular Biogeographic Region.

The sanctuary consists of the trail corridor from Waipio Valley, the embayment, submerged lands, wetlands, and about 60 percent of the upland watershed of the Waimanu Stream and its tributaries. Approximately 720 acres are valley bottom lands, primarily freshwater wetlands. The remaining acres are heavily vegetated talus slopes, uplands and valley walls. The estuarine portion consists of less than five acres. These lands include the major components of a total ecological unit, protecting the last perennial, undiverted stream on the Island of Hawaii.

Though once occupied by early Hawaiians, the valley is now uninhabited, and visited only occasionally by fishermen, hunters and campers. The bottom lands of the valley, which at one time were used for taro cultivation, now function as a valuable wetland ecosystem.

Land access to the valley is limited to the eight-mile Waipio-Waimanu Trail. The only other means of entering the valley are by helicopter and boat. The limited access has, of course, minimized human activity in the valley, thus enabling its re-emergence as a pristine stream-valley ecosystem.

Organization and Management

The primary management objective of the Waimanu Estuarine Sanctuary Program is to promote and protect natural processes and systems in the sanctuary.

In line with this, the following scientific objectives were established:

- 1) Enhance the understanding of watershed and estuarine ecosystems through the conduct of studies, including productivity measurements, and distribution of life history studies of estuarine organisms;

- 2) Develop policy and management criteria, and use the Waimanu Valley estuarine and riverine ecosystems as a control variable against which changes in other estuaries can be compared; and
- 3) Promote the conduct of estuarine research and educational activities.

The tasks of developing a sanctuary program to meet these objectives are shared by the Department of Planning and Economic Development (DPED) and the Department of Land and Natural Resources (DLNR). As formalized by a Memorandum of Interagency Agreement, the DPED has assumed responsibility for all fiscal/administrative matters relating to the sanctuary program. The DLNR has assumed responsibility for land acquisition and management program development activities.

The proposed State Regulation #8, concerning the establishment, protection, and regulation of the Waimanu Estuarine Sanctuary will serve as the primary mechanism for achieving the sanctuary's management objectives. Regulation 8, currently being prepared for public hearing, contains provisions for permitted uses, use restrictions, and prohibited acts. In general, the following uses will be permitted in the sanctuary:

1. scientific, anthropological, and archaeological research;
2. education and nature interpretation; and
3. wildlife viewing.

The final implementation of a management program for the sanctuary will, of course, require that the State acquire private landholdings in the valley. Approximately 360 acres of the valley's bottom lands are now privately owned, with the State maintaining ownership of the remainder of the lands within the sanctuary boundaries. An appraisal of these private landholdings has been completed and preparations for acquisition are underway.

In addition, a forest products valuation appraisal and a water rights valuation appraisal were undertaken by the State to establish the Waimanu Valley's foregone value of forest products and water leasing rights in dedicating the valley to "sanctuary" use. This dollar value is to be used as the basis for the state's match to the grant award.

Research

Although the management program is not fully implemented at this time, one major research activity has been completed during the program development phase. The state's Department of Health, in cooperation with the DPED and DLNR, has conducted an in-depth field survey of mammalian fauna in the Waimanu Valley in order to isolate reservoirs of the leptospirosis bacteria. Public health concerns over recent cases of leptospirosis in the valley prompted health officials to initiate the survey and investigation.

Education

Due to limited access, the education program in the Waimanu sanctuary will consist of nature and interpretive trails. The primitive, and sometimes hazardous conditions in the sanctuary pose natural constraints on the size of an educational program.

It is anticipated that all program development activities will be completed by September, 1980, thereby creating an ongoing operational program for the protection and enhancement of this unique insular estuarine system.

OLD WOMAN CREEK ESTUARINE SANCTUARY

Huron, Ohio

Location and Description

In 1977, the federal Office of Coastal Zone Management awarded a grant to the State of Ohio for establishment of Old Woman Creek National Estuarine Sanctuary in the Great Lakes Biogeographic Region. Old Woman Creek was the first freshwater body to be designated as an estuarine sanctuary. As one of the least disturbed areas along Lake Erie's south shore, the 600 acre sanctuary has several natural features which include coastal marshland, sand bars, a barrier beach, a relic prairie, and upland forests. Land acquisition is currently 90 percent complete, with negotiations underway for the remaining tracts.

Organization and Management

Upon completion of the land acquisition, Old Woman Creek will be dedicated as a state nature preserve and will become an integral part of Ohio's Nature Preserve System. It is presently being managed by the Division of Natural Areas and Preserves of the Ohio Department of Natural Resources.

Research

The research and monitoring program was initiated during the spring of 1979, when water quality monitoring began on a weekly basis at four stations within the estuary. During the past summer, the staff have devoted much of their efforts toward the construction of a morphometric map of the estuary and creek lying within the sanctuary. A species list of the aquatic plants and animals of the Old Woman Creek watershed is presently being compiled. In conjunction with these aquatic studies, the terrestrial vegetation within the sanctuary is also being mapped. Species lists of the terrestrial plants and animals are also being tabulated and annotated.

Although research activities undertaken by the staff are largely premonitoring in character, a research project by members of the Civil Engineering Department of the Ohio State University is now in progress. This project examines the transport properties of a seiche-affected stream mouth.

Upon completion of the new research facility, a detailed analysis of nutrient flows within the estuary and adjacent lake and creek areas

will be undertaken. Seasonal patterns of the major biota in the estuary will be determined. In addition to these monitoring activities, the staff will cooperate with other workers conducting research within the sanctuary. For example, a cooperative project with Ohio Sea Grant is planned in which fish fry populations of a small natural estuary will be compared with those of a larger manipulated estuary. The staff biologist is presently engaged in coordination of graduate level research projects on the littoral diatoms of Lake Erie and on the nutrient dynamics of selected macrophytes.

Future plans call for Old Woman Creek Sanctuary to become a center for estuarine and coastal wetland studies in Ohio.

Education

With the interest generated by the establishment of a national estuarine sanctuary along Lake Erie's shore, the educational program at this preserve began immediately after a permanent staff was hired. These early programs have concentrated on the significance of estuaries and the long-range management goals of Old Woman Creek Sanctuary. Presently, many off-site public information programs focus upon the role of estuaries in the ecosystem, as well as the importance of wetland ecosystems to man. Although facilities are still very limited at the sanctuary, various youth and civic groups have visited the estuary for bird hikes and wild-flower walks. Guided canoe tours of the estuary have also been conducted by the sanctuary staff from time to time and have been very effective. During the first eight months the sanctuary was in operation, approximately 800 people visited it and another 900 persons have attended off-site lectures and nature programs conducted by the Old Woman Creek manager.

The proposed visitor center will become the focal point of public education and interpretive programs. This facility will house a permanent display depicting the ecology of the estuary. In conjunction with this facility, guided tours along nature trails or through the estuary by canoe will be regularly provided. Cooperative on-site educational programs will be instituted with local schools and various youth organizations. Currently, one such cooperative program with the biology department in a local secondary school is nearing the final planning stages. Old Woman Creek Estuary will serve these students as an outdoor classroom.

ROOKERY BAY ESTUARINE SANCTUARY

Naples, Florida

Location and Description

The Rookery Bay National Estuarine Sanctuary is located in Southwest Florida approximately five miles south of Naples, Collier County. This relatively undisturbed ecosystem is representative of the West Indian Biogeographic Region. The sanctuary primarily consists of mangrove forests and islands, bays and rivers, and a pine-palmetto scrub oak climax community. Mangrove forests are the dominant habitat in the sanctuary. Red mangroves (Rhizophora mangle) are common on oyster bars and along the shoreline. Dense black and white mangrove forests (Avicennia germinans and Laguncularia recemosa) are typical in the interior of the sanctuary. Some areas of salt marsh are found within the sanctuary and have showed considerable increase in size during the past few years. A variety of submerged and intertidal habitats, including soft bottoms, oyster bars, sea grasses, red mangrove prop roots, and black and white mangrove pneumatophores, are found in the sanctuary.

Over 70 species of fish, 65 species of macrocrustaceans and 55 species of mollusks have been identified in Rookery Bay and its many tidal creeks. Numerous species of fish and shellfish are taken by commercial and sport fishermen. Boats engaged in fishing and sightseeing activities are a common sight.

Rookery Bay was designated a National Estuarine Sanctuary by the Office of Coastal Zone Management in 1978. However, the history of this sanctuary goes back to 1966, when the Collier County Conservancy was formed. In the ensuing years, the Conservancy and the National Audubon Society purchased over five thousand acres of environmentally sensitive estuarine wetlands. In 1966, these holdings were organized by the Collier County Conservancy and the National Audubon Society as the Rookery Bay Sanctuary. In 1975, the Collier County Conservancy, Audubon, and The Nature Conservancy asked the Florida Department of Natural Resources to have the Rookery Bay Sanctuary designated as a National Estuarine Sanctuary. Through an Agreement and Lease, the Collier County Conservancy, the National Audubon Society, and The Nature Conservancy leased approximately 5,400 acres of the Rookery Bay Sanctuary to the Florida Department of Natural Resources for establishment of the Rookery Bay National Estuarine Sanctuary. All parties also agreed to participate in joint management planning for the sanctuary. An application for federal assistance was submitted to the Office of Coastal

Zone Management in September, 1978, and a grant-in-aid was awarded to the Florida Department of Natural Resources in October, 1978.

Organization and Management

Under the conditions in the Agreement and Lease, the Florida Department of Natural Resources established a sanctuary management board to develop management guidelines, policies, and procedures pertaining to all activities conducted within the sanctuary. This board consists of one representative each from the Florida Department of Natural Resources, the National Audubon Society, and the Collier County Conservancy. The Florida Department of Natural Resources member serves as chairman of the board.

A sanctuary manager hired by the Florida Department of Natural Resources handles the day-to-day activities in the sanctuary and coordinates all research activities. These include promotion of the sanctuary as a research site, reviewing specific proposals for research in the sanctuary, and monitoring and assessing the overall environmental quality in the sanctuary.

Currently, the sanctuary headquarters are located in the city of Naples. However, there are plans for the construction of a sanctuary headquarters and laboratory to be located on land that will ultimately become part of the sanctuary. (This building was completed in March of 1982). Plans also exist to increase the size of the sanctuary to approximately 9,000 acres through the purchase of additional land. The Florida Department of Natural Resources has received a grant-in-aid award from the Office of Coastal Zone Management and the State of Florida for land acquisition. Additional mangrove stands and upland buffers have been identified as desirable supplements to the sanctuary, and the purchase of these sites is being negotiated.

Research

The research program is still in its developmental stages. However, before its designation as a National Estuarine Sanctuary, a research program was established by the Collier County Conservancy to gather baseline data and provide a description of hydrography, water quality, and biological conditions. Work was conducted at the Conservancy's Rookery Bay Marine Station, located in the Rookery Bay Sanctuary. This program, started in 1970, has continued to the present.

Data on tides, temperature, salinity, dissolved oxygen, turbidity, nutrients, and coliform content are available. In addition, partial species lists have also been prepared. This program will be continued and somewhat expanded by the Florida Department of Natural Resources.

Availability of background data provides interested researchers with a perspective of the physical, biological and chemical conditions which characterize the sanctuary. These needed and seldom available background data can be a valuable asset in planning research. In Rookery

Bay, these data are supplemented by research results concerning nutrient transport in black mangrove forests, invertebrate ecology, sedimentation of oyster bars, and the geology of oyster bars.

Education

The public education program will be coordinated by the Collier County Conservancy. For ten years, this organization has conducted an environmental education program for fourth and seventh grade students from Collier County public schools, and has held numerous seminars, workshops, lecture series, and nature walks for the general public. The Conservancy plans to build a nature center on land leased to them by the State of Florida and to construct an interpretative trail system within the sanctuary. This site will be open to the public and will feature exhibits, tours, and educational programs which depict the complex nature of the Rookery Bay ecosystem, the benefits the sanctuary provides to man, and the problems faced in protecting this area.

APALACHICOLA RIVER AND BAY

ESTUARINE SANCTUARY

Franklin and Gulf Counties, Florida

Location and Description

Although Rookery Bay, a West Indian Biogeographic Classification Estuary, was the State's first nominee for designation as a national estuarine sanctuary, interest and concern were expressed regarding the resource values of Apalachicola Bay. In early 1977, nominations were solicited for a site representing the Louisianian Province, and the Apalachicola system was virtually a unanimous selection. However, obtaining a designation was a much more difficult process than expected.

The Apalachicola River and Bay ecosystem was designated sanctuary status in September, 1979. The Florida Department of Environmental Regulation, Bureau of Coastal Zone Management was the state agency responsible for drafting the proposal; however, the Department of Natural Resources will be the management agency and the transfer of the program to this department is presently in process. Sanctuary designation has been achieved and now the new lands proposed for purchase must be obtained. In addition, the actual operation of the sanctuary must be implemented, including a research and education program.

The Apalachicola River and Bay Estuarine Sanctuary will encompass in excess of 190,000 acres. Of this total, about 44,000 acres are already publicly owned and approximately 135,000 acres are estuarine waters and associated submerged lands. In September, 1979, Florida was awarded \$1,799,106 to acquire 12,467 additional acres, primarily of selected freshwater swamps and marsh, salt marsh, and submerged grasses. This addition consists of nineteen parcels to be purchased from private owners, and, as noted, will constitute a small portion of the entire sanctuary, i.e., 192,758 acres.

The total cost of the 12,467 acres has been estimated at \$3,600,000. Florida will contribute the balance of funds, or about \$1,950,000, from its Environmentally Endangered Lands program. During the next three years, Florida will apply for operation grants to be matched by the excess funds contributed for land acquisition.

The Apalachicola River and Bay Estuarine Sanctuary was a unique proposal because the river is part of a tri-state river system. The Apalachicola River is formed by the confluence of the Flint and Chattahoochee Rivers draining Georgia and Alabama. Together they comprise the A - C - F river system, currently managed by the United States Army

Corps of Engineers for the following objectives; 1) navigation, 2) hydro-power, 3) water supply, 4) water-related recreation, and 5) flood control. These objectives are of more importance to Georgia and Alabama since they receive most of the related benefits. This inequity caused a greater than expected resistance by the two states to the sanctuary proposal. Georgia and Alabama stated that while they were not necessarily against the sanctuary, they wanted to be assured that their interests would not be adversely affected. The Department of Environmental Regulation, Bureau of Coastal Zone Management, in conjunction with the federal Office of Coastal Zone Management, drafted a proposal considering not only local, state and federal interests, but also those of Georgia and Alabama. The Environmental Impact Statement explicitly stated that sanctuary designation would not significantly interfere with the present usages of the Apalachicola River and Bay, nor would it adversely affect the upstream system. In fact, it is expected that the research program of the sanctuary will be a vehicle to determine positive actions that can be taken to assure the continued long-term usages of the river and bay for present and future generations. Thus, Florida can have the sanctuary without precluding any activities now occurring on or in the Apalachicola River and Bay.

Organization and Management

The newly acquired lands will be managed under the state's Environmentally Endangered Lands program, administered by the Department of Natural Resources. A sanctuary management committee will be formed to advise on appropriate activities and policies. This committee will serve in a variety of both advisory and substantive roles to provide for effective coordination and cooperation among all interests involved with the sanctuary program. Also, the sanctuary water areas will be administered under the state Aquatic Preserve program and water quality laws.

The primary objective of the Apalachicola River and Bay Estuarine Sanctuary is to provide long-term protection for the lower Apalachicola River and Bay ecosystem in order:

- 1) to provide opportunities for research and education utilizing a natural estuarine system; and
- 2) to maintain the natural productivity of the estuary and the economic benefits produced by its renewable resources.

To achieve this objective, the chief management policy for the sanctuary is to avoid or prevent actions and alterations which would adversely affect the sanctuary ecosystem. The State will use only existing authorities to manage the land; in keeping with this objective and policy, the sanctuary designation will not prohibit or preclude any activity now occurring on the Apalachicola River and Bay. The sanctuary, then, will be managed in accordance with existing state policies and laws, especially those in Chapters 373, 403 and 253, Florida Statutes (F.S.). These laws provide permitting authorities for the Department of Environmental Regulation over dredge and fill activities, air quality, water quality, and the management of ground and surface waters. In

addition, policies and practices relating to environmentally endangered lands (Chapter 259, F.S.) and aquatic preserves and state parks (Chapter 258, F.S.) will be relied upon to provide specific management procedures for individual parcels within the sanctuary. It is anticipated that these existing state laws will be sufficient to provide the necessary protection without adopting new standards, criteria, procedures, or policies.

Research and Education

Programs for research and education in this sanctuary will be developed in the near future.

ELKHORN SLOUGH ESTUARINE SANCTUARY

Monterey Bay, California

Location and Description

The Elkhorn Slough estuarine complex, one of the largest and most important in the Californian Biogeographical Region, is located near Moss Landing, a small community situated on Monterey Bay, approximately 100 miles south of San Francisco. Immediately offshore from the slough mouth lies the vast submarine canyon of Monterey Bay. The entire estuarine system is composed of the Elkhorn, Moro Cojo, Tembladero, Bennett, and McCluskey Sloughs and their respective drainage basins. These basins, collectively referred to as the Elkhorn Slough watershed, encompass lands between the Pajaro and Salinas valleys, are an estimated 226 square miles. Elkhorn Slough itself, the largest of the systems, curves inland to the north for approximately seven miles and drains an upper watershed consisting of ancient sand dune and marine terraces.

The unique combination of oceanic and terrestrial influences has made the Elkhorn Slough complex one of the most significant estuarine systems on the California coast and along Pacific migratory bird flyway. The slough's tidal wetlands support abundant wildlife, providing habitat for a number of rare and endangered animals as well as providing important feeding and resting habitat for resident and migratory shorebirds and waterfowl.

The immediate foreslopes which surround Elkhorn Slough are now used or were formerly used for a variety of agricultural pursuits, including truck crops, dairy operations, and grazed pasture. The interior areas of the eastern watershed contain scattered rural residential and small farm development. At the western end, near the mouth of Elkhorn Slough, lie abandoned saltponds. More intensive uses of an industrial, commercial, and institutional nature are situated in the waterfront community of Moss Landing. Some of these uses include a fossil fuel power generating facility, a 400-boat fishing harbor, various fishing-related commercial operations, and the Moss Landing Marine Laboratory research facility.

Physical access to the slough region is by California State Highway Route 1, which bridges the eastern end of Elkhorn Slough. Low clearance of the highway bridge limits passage of large boats into the main slough system. A series of small county roads wind through the watershed, providing automobile access to inland areas. Additionally, the Southern Pacific railroad (AMTRAK) main line runs along the slough's eastern shore.

Organization and Management

Probably the most significant and most difficult aspect of the Elkhorn Slough Sanctuary will be the development of the sanctuary management plan. As with many natural resource areas in California and with other sanctuaries in the national program, public ownerships of lands does not necessarily provide or include the most efficient management unit. Numerous agencies at all levels of government are concerned with the management of the Elkhorn Estuarine Sanctuary. The most important agency involvement will be through those which contribute to or enable research, education, maintenance, and where possible, enhancement of natural resource values. Fortunately, through California's Coastal Zone Management Program and in conjunction with the research program by sponsored Sea Grant, the proposed sanctuary management program as currently envisioned will provide a prototype model for managing estuarine units amidst a complex, multiple use watershed.

The agencies involved in the designation of the Elkhorn Slough Sanctuary recognized that the wetland ecosystem of Elkhorn Slough included the slough waters, benthos, mud flats, salt marsh, adjacent fore-slopes (immediate watershed) and, in fact, the entire watershed. The ultimate management goal of the Elkhorn Slough complex, therefore, is to manage this entire ecosystem as a single ecological unit - a formidable task. In the interim, the California Department of Fish and Game with its expertise in wetland management, will be the lead managing agency. An interim project manager from Department of Fish and Game will administer the sanctuary programs with the assistance of an advisory coordinating committee.

The sanctuary management plan will be developed by the formal advisory/coordinating committee. The main work of this committee will be to:

- 1) develop criteria and qualifications for a permanent sanctuary manager and staff;
- 2) establish a work program for the manager and staff;
- 3) review policies established by the Department of Fish and Game;
- 4) review proposals for research and education programs;
- 5) review other programs, development proposals and conflict of uses which could affect the sanctuary operation; and
- 6) assist in the preparation of a Sanctuary Management Plan for submittal to local governments and the California Coastal Commission for formal certification under the California Coastal Act.

The California legislature, under the Coastal Act of 1976, delegated a primary responsibility upon local governments (cities and counties) for implementation of the state's coastal zone management program. All the lands within the sanctuary and wildlife refuge boundaries, as well as the majority of the Elkhorn estuarine watershed complex, are within

California's coastal zone boundaries. Special local coastal planning efforts are necessary because of the national and statewide interest and significance of the National Wildlife Refuge and Estuarine Sanctuary programs at Elkhorn Slough. These must be carried out by the local Monterey County government in coordination with state and federal resource management agencies.

State agencies involved with the sanctuary program have indicated that the success of Monterey County's Local Coastal Program (LCP) as a means of achieving the requirements of the California Coastal Act related to estuarine management will depend in large part upon a valid scientific basis for the preparation and evaluation of the LCP. This is especially true for the development of scientific land use management criteria, development guidelines, and carrying capacities for the watershed of the Elkhorn Slough estuarine complex. The focus of the Sea Grant research within the Elkhorn system will be the creation of a framework for relating and incorporating scientific information in coastal zone management programs for estuarine systems. The research approach is utilizing a combination of analysis of existing baseline data, experimental work to quantify specific cause and effect relationships, and field work. This research, which includes the entire sanctuary area, will develop quantifiable methods for relating existing and proposed land uses within the estuarine watershed to direct biological impacts within the estuarine complex.

State agencies anticipate that the wetland management policies and programs developed for the Elkhorn Sanctuary and watershed with Sea Grant's assistance will be applicable to other wetland systems in California. Accordingly, implementation of the sanctuary management program will result in opportunities for scientific investigation and educational uses within the entire Californian Biogeographic Region.

Research

An essential element of the estuarine sanctuary program will be the creation of "natural field laboratories" in which to gather information essential to implementing coastal zone management decision-making. The Elkhorn Slough complex will continue to receive much research use. Four university/graduate facilities are located around Monterey Bay, within 20 miles of the slough complex: The University of California at Santa Cruz and J. Long Marine Station, the United States Naval Postgraduate School at Monterey, Stanford University's Hopkins Marine Station in Pacific Grove, and Moss Landing Marine Laboratories, a research station serving a consortium of several California State Universities. These institutions, plus three junior colleges in the area involve over 700 students each year in field and/or long-term research projects in the slough complex, including areas within the sanctuary. Universities and colleges outside the Monterey Bay area, and high schools and elementary schools bring another 2000 students to the slough complex annually on field trips.

Present research at Hopkins Marine Station and Moss Landing Marine Laboratories is examining the slough complex, and an even greater poten-

tial exists for more intensive research in the sanctuary. One major research project involving the Sea Grant Program at the University of California at Berkeley, Moss Landing Marine Laboratories, and state and local coastal zone management planning agencies has been underway for two years. It seeks to analyze certain development impacts on the estuarine ecology of the Elkhorn complex.

The sanctuary research program, in order to assure consistency of the Elkhorn Slough program within the national sanctuary network, will include:

- 1) an organization framework and coordinating function to establish priorities and monitor, review, and evaluate all research programs;
- 2) an administrator's facility, a library with computer access, and a wet lab facility; and
- 3) increased managed access to parts of the slough.

Education

A major objective of the sanctuary education program will be to expand and improve the general public's understanding and appreciation of the natural resources and functions of an estuarine ecosystem. These relationships and functions will be explained in terms of the historic and present role of man in the estuarine environment, as well as concepts of coastal zone resource management and conservation. At present, the Elkhorn Slough complex is used extensively at all academic levels and by clubs, private organizations, and visitors for recreational and educational uses such as bird observation and other nature study. However, the sanctuary lacks improved visitor-serving facilities. Therefore, the primary educational needs at the Elkhorn Sanctuary will be to:

- 1) provide managed public access within the slough area to provide sufficient exposure to all aspects of the estuarine system;
- 2) develop interpretive facilities for the sanctuary including field displays and materials which will enhance the field experience; and
- 3) hire or assign sanctuary personnel for coordination and public information/communication.

The concept for the future educational program will include essentially the same elements as the research program; coordination and management, interpretive facilities (on and off-site); and increased access to all parts of the slough.

APPENDIX B
WORKSHOP REGISTRANTS

APPENDIX B

WORKSHOP REGISTRANTS

In addition to the registrants, a large number of scientists attending the Estuarine Research Federation meeting dropped in, and made many contributions, especially in the research session.

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