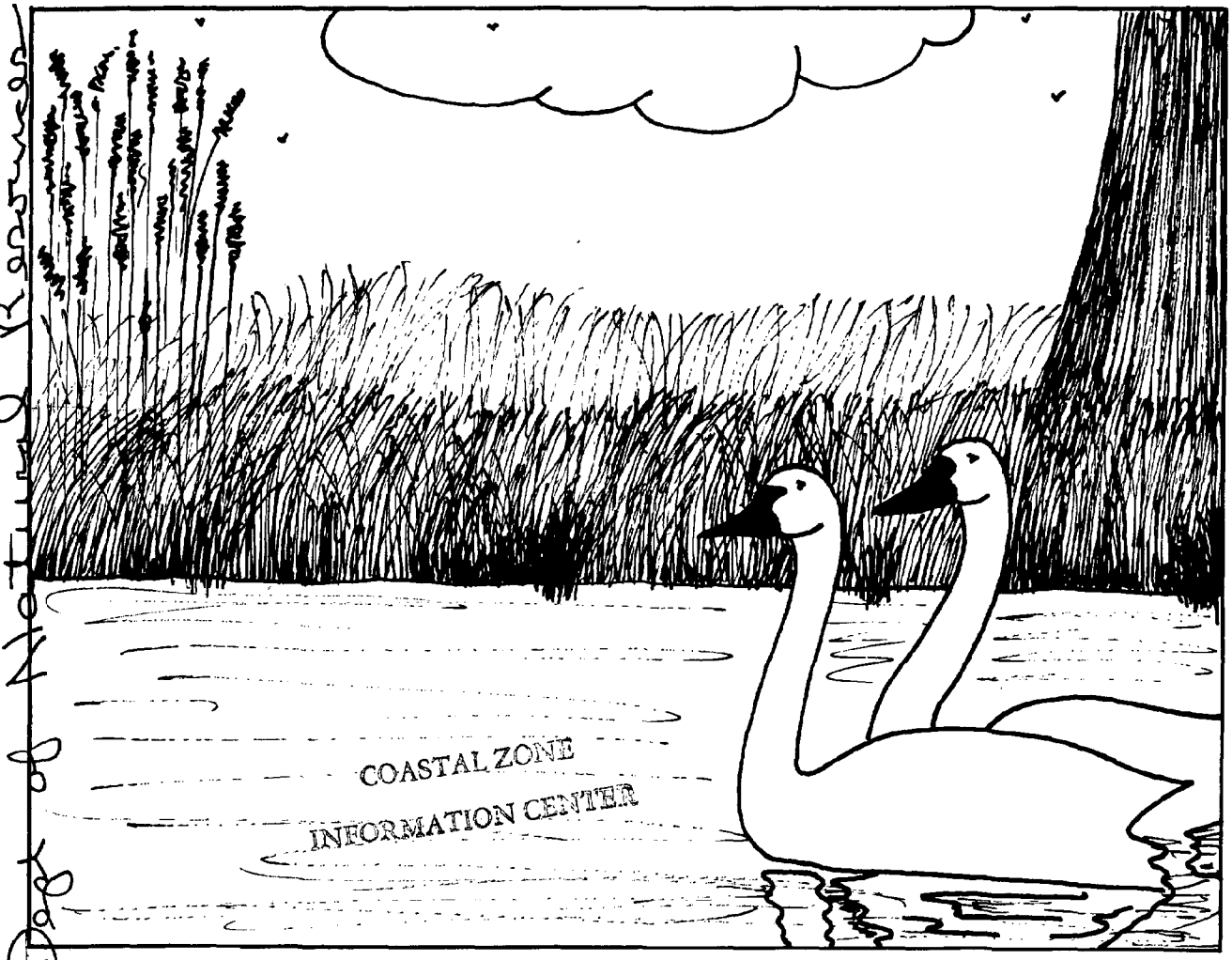
CHESAPEAKE BAY ESTUARINE SANCTUARY PROGRAM IN MARYLAND

MULTIPLE SITE MANAGEMENT PLAN, MONIE BAY AND RHODE RIVER PLANS

PUBLIC REVIEW DRAFT (January ~~March~~ MAY, 1983)



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MARYLAND DEPARTMENT of NATURAL RESOURCES
TIDEWATER ADMINISTRATION
in cooperation with
U.S.DEPARTMENT of COMMERCE
NOAA

JANUARY, 1983

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IN MARYLAND

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MONIE BAY

AND

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NOAA

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TABLE OF CONTENTS

SECTION	PAGE
Reviewer's Instructions	v
Introduction	vi
Program Chronology of Major Activities	vii
Program Timeframes for 1983-4	viii
Chapter I: Multiple Site Management Plan	
0 Goals and Objectives	I-1
A. Sanctuary Organization	I-3
*Figure I-A: Organization Chart of the Chesapeake Bay Estuarine Sanctuary Program in Maryland	I-4
B. Site Selection	I-10
*Figure I-B: Ecological Zones for Estuarine Sanctuary Site Selection	I-12
C. Sanctuary Program Direction	I-16
D. Conclusions	I-23
E. Recommendations	I-25
F. Reviewer's Worksheet	I-27
Chapter II: Rhode River Site Management Plan	
0 Introduction	II-1
A. Background	II-2
*Figure II-A: Rhode River Resource Map	II-5
*Table II-1: Vegetation Types Present at Rhode River Sanctuary Site	II-7
*Figure II-B: Rhode River Zoning Map	II-10
B. Site Use and Existing Plans	II-11
*Table II-2: CBCES Visitor Use 1981-2	II-11
*Figure II-C: Rhode River Facilities Map	II-12
*Table II-3: Estuarine Sanctuary Related Research, Past & Current, at CBCES	II-16
*Table II-4: Estuarine Sanctuary Related Education Activities, Past & Current, at CBCES	II-21

TABLE OF CONTENTS (CONT.)

SECTION	PAGE
C. Sanctuary Management	II-23
*Table II-5: Suggested Research Opportunities at Rhode River Estuarine Sanctuary Site	II-30
D. Site Management Plan Policies & Guidelines - Consistency Determinations	II-35
E. Conclusions	II-41
F. Recommendations	II-43
G. Reviewer's Worksheet	II-45
Chapter III: Monie Bay Site Management Plan	
0 Introduction	III-1
A. Background	III-2
*Figure III-A: Monie Bay Regional Map	III-6
*Table III-1: Selected Vegetative Types Present at Monie Bay Sanctuary Site	III-7
*Table III-2: Representative Vegetation at DIWMA	III-8
*Figure III-B: Monie Bay Activities Map	III-10
*Figure III-C: Monie Bay Access and Zoning Map	III-12
B. Site Use and Existing Plans	III-13
*Table III-3: Estuarine Sanctuary Related Research, Past & Current, at DIWMA	III-15
C. Sanctuary Management	III-18
*Table III-4: Suggested Research Opportunities at Monie Bay Estuarine Sanctuary Site	III-27
D. Site Management Plan Policies & Guidelines - Consistency Determinations	III-32
E. Conclusions	III-44
F. Recommendations	III-46
G. Reviewer's Worksheet	III-48

TABLE OF CONTENTS (CONT.)

SECTION	PAGE
Appendices	
Appendix A: Maryland Estuarine Sanctuary Program Advisory Committees	A-1
Appendix B: Research Directions for the Maryland Estuarine Sanctuary Program	B-1
Appendix C: From "Proposal: Long Term Ecological Research on the Rhode River Watershed/Estuarine Ecosystem" submitted to the National Science Foundation by the Chesapeake Research Consortium, February, 1980.	C-1
Appendix D: Application for Permission to use Facilities of the Chesapeake Bay Center for Environmental Studies	D-1
Appendix E: Memorandum of Understanding Between the State of Maryland and the Smithsonian Institution Concerning the Establishment and Administration of the Chesapeake Bay Estuarine Sanctuary at Rhode River	E-1
Appendix F: Avian and Mammalian Species Found on Deal Island Wildlife Management Area, 1977	F-1
Appendix G: Vegetative Cover, Monie Bay Site Upland Area	G-1
Appendix H: Maryland Wildlife Administration Sample Project Proposal Form	H-1
Appendix I: Model Habitat Guidelines for Dabbling Ducks at Deal Island Wildlife Management Area	I-1
Appendix J: Model Habitat Guidelines for Bobwhite Quail at Deal Island Wildlife Management Area	J-1
Appendix K: Deal Island Wildlife Management Area Trapping Form	K-1
Appendix L: From "Proposed Work Program for Archeological Investigations of the Rhode River Sanctuary Education Complex, Anne Arundel County, Maryland, December 1982"	L-1

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DEPARTMENT OF NATURAL RESOURCES
TIDEWATER ADMINISTRATION
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REVIEWER'S INSTRUCTIONS

Thank you for your willingness to review and comment on Maryland's Estuarine Sanctuary Program Draft Management Plan. Your remarks should be sent to my office by ~~March 20th~~ MAY 15th *for timely consideration. In the weeks ahead, DNR, the Estuarine Sanctuary Management Committee, and the two Site Advisory Committees will examine your comments along with those of other reviewers as we prepare a final management plan by ~~March 31st~~* JUNE 30th.

Our intention from the beginning has been to establish a program which would enable the preservation, research and education use of a combination of special estuarine natural areas to contribute meaningfully to the work of Chesapeake Bay management. This draft represents the ideas of many as to what such a program should entail, and what institutional arrangements should be used to administer it successfully. With this in mind, we need to know whether this approach has your support. We also need to know whether the management plan satisfactorly addresses the topics important to your interests; whether there are inaccuracies contained in it; and whether significant ommissions occurred. In other words, we seek your suggestions as to what is needed to make the plan better and more complete.

The removable worksheets may be used for comments on all subsections as well as the plan overall. You may, of course, mark up the plan draft and return it, or reply with your comments in a different way, if you prefer.

Again, thank you for your help!

Scott Brumburgh
Estuarine Sanctuary Manager

INTRODUCTION

The purpose of this document is to present the management plans of Maryland's Chesapeake Bay Estuarine Sanctuary Program. In it are presented the approaches Maryland intends to use in administering its Program, promoting research and educational activities, and preserving up to four designated sites. Also included is the site selection process used to assemble the multiple-site Program.

The document is arranged so that each of the site plan chapters is a complete and independent document. The first chapter overviews the administration, organization, education, research and consistency guidelines for the entire Program. Included are policies and specific activities basic to operating each of the individual sites within the Sanctuary Program.

The next two chapters consist of management plans for the first two sites at Rhode River and Monie Bay. The appendices include background information and references applicable to the sites and the overall Program.

As additional sites are selected, new management plan chapters will be added.

This plan was prepared by:

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with the help of:

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CHESAPEAKE BAY ESTUARINE SANCTUARY PROGRAM DEVELOPMENT

Chronology Of Major Activities

1974 -- After the Federal Estuarine Sanctuary Program is established, Maryland Department of Natural Resources (DNR) begins a site selection process; the recommended site is World's End Creek in Dorchester County. The recommendation is withdrawn after an acquisition of private land approach is rejected by local residents.

1975-1980 -- No action to reinitiate Chesapeake Bay Sanctuary Program.

May 1980 -- State Estuarine Sanctuary Steering Committee formed by DNR meets to begin new site selection process; two candidate sites selected are Rhode River and Monie Bay.

September 1980 -- Maryland DNR applies for Preacquisition Grant from National Oceanic & Atmospheric Administration (NOAA). Funds are used for gathering information on the first two sites, and establishing the concept of a multi-site sanctuary system.

January 1981 -- NOAA awards $17,500 Preacquisition Grant to DNR, matched by equivalent in-kind (salaries and services) funds from the State. DNR applies for $600,000 Acquisition Grant from NOAA to support proposed activities at the two sites.

September 1981 -- Acquisition Grant of $600,000 approved for Maryland.

September - November 1981 -- Nominations solicited by DNR for local Site Advisory Committees at Rhode River and Monie Bay; committees were formed and began meeting during 1982.

January 1982 -- Estuarine Sanctuary Management Committee formed.

April 1982 -- Maryland DNR applies for $50,000 Operation Grant from NOAA to assist in the day-to-day operation of the Sanctuary Program.

September 1982 -- Operation Grant of $50,000 awarded to Maryland.

CHESAPEAKE BAY ESTUARINE SANCTUARY PROGRAM TIMEFRAMES

1983-84

By January 1, 1983 -- Sanctuary operations performance report due to NOAA for the period September 1 - December 31, 1982.

By March 31, 1983 -- Approval of Maryland Estuarine Sanctuary Management Plan.

By March 31, 1983 -- Final selection of two additional sites to be nominated for the Sanctuary.

By April 1, 1983 -- Permanent signs installed at appropriate places pointing to the existing Sanctuary sites.

April 1 - August 31, 1983 -- Period of Sanctuary Program contract for education coordinator position at Rhode River Site ($12,500.00 maximum).

April 6, 1983 -- Suggested starting date by Md. Historical Trust for archeological testing at Rhode River Education Complex tract.

By April 30, 1983 -- Suggested starting date for Monie Bay site operations contract for Md. Wildlife Administration under Sanctuary Program ($12,500.00 maximum).

By April 30, 1983 -- Develop plan and schedule for Sanctuary interpretive program at each site for summer, 1983.

By April 30, 1983 -- Develop descriptive materials and exhibits for the Sanctuary.

By April 30, 1983 -- Sanctuary acquisition performance report due to NOAA for the period October 1, 1982 - March 31, 1983.

By April 30, 1983 -- Sanctuary operations performance report due to NOAA for the period January 1 - March 31, 1983.

By May 31, 1983 -- Develop plan and schedule for taking the Sanctuary interpretive program to schools and colleges in the State during 1983-84.

By May 31, 1983 -- Suggested deadline for Memorandum of Understanding between Tidewater and Wildlife Administrations on Monie Bay Site.

By June 30, 1983 -- Suggested deadline for developing 1983-84 Program annual plan and site plans for Rhode River and Monie Bay, including research and education elements.

By July 1, 1983 -- Annual operating budget for Rhode River and Monie Bay Sites prepared.

July 11, 1983 -- NOAA site evaluation of Maryland Estuarine Sanctuary Program.

By July 31, 1983 -- Sanctuary operations performance report due to NOAA for the period April 1 - June 30, 1983.

By November 31, 1983 -- Sanctuary operations final performance report due to NOAA for the past year.

By July 1, 1984 -- Annual operating budget for Rhode River and Monie Bay Sites prepared.

By September 1, 1984 -- Completion of all land acquisition at the Rhode River and Monie Bay Sites.

By September 29, 1984 -- Construction of education building and related structures at the Rhode River Site education complex completed.

OTHER

No later than 3 months following date of execution of Smithsonian Institution and Dept. of Natural Resources MOU on the Rhode River:

* Smithsonian Institution to execute 50-year leasehold interest to DNR on 15 acre parcel for the Rhode River Sanctuary education complex; and
* DNR and Smithsonian Institution to prepare document entitled, "Procedures for Construction of the Rhode River Sanctuary Education Complex."

After July, 1983, start construction of boat ramp at Monie Bay Site.

CHESAPEAKE BAY ESTUARINE SANCTUARY PROGRAM IN MARYLAND

MULTIPLE SITE MANAGEMENT PLAN

INTRODUCTION: GOALS AND OBJECTIVES

This document comprises Maryland's plan for the management and development of an Estuarine Sanctuary in Maryland under Section 315 of the Federal Coastal Zone Management Act of 1972 (PL 92-583) as amended.

Maryland's Program is a multiple site research and education system. Its purpose is to enhance the management capabilities of the State for conserving the Chesapeake Bay. It is also intended to raise the public's awareness of the intrinsic value of the Bay and its tributaries as estuaries worthy of protection and invaluable for learning.

The national objective in establishing the Chesapeake Bay Estuarine Sanctuary lies in maintaining a permanent, representative national field laboratory in the Virginia biogeographic region. This is one of eleven different basic estuarine areas that together constitute a system for designating sanctuaries under federal legislation. This particular region stretches from Cape Cod, Massachusetts to Cape Hatteras, North Carolina.

The Estuarine Sanctuary Program is a combination of State Coastal Zone Management policy for preserving areas of over-riding State interest coupled with the immediate need to apply greater specific, geographic information to resource decisions in the Chesapeake Bay region.

For Maryland, the Program will first assure a number of relatively undisturbed estuarine systems which may be used as natural control areas for assessing human impacts in other parts of the Bay. It is expected to assist agencies and institutions around the Bay in gathering and disseminating estuarine data in a manner that benefits those dependent upon the productivity of the estuary as a renewable resource. By preserving and managing valuable estuarine sites--each representative of particular ecological characteristics--the

Estuarine Sanctuary Program will provide locations essential for hands-on learning and in-the-field educational experiences. These experiences can bolster the understanding and appreciation of our nation's estuaries and their biological, geological, economic, social and historical importance.

The Sanctuary Program will not be an independent research and environmental education program added to the present number of such efforts on the Bay. The Program offers instead, permanent sites where research and educational professionals can carry out their activities in unique settings and in complementary fashion. A measure of the Program's success will come from the role it establishes in providing useful, baseline estuarine study and learning sites and, therefore, usable knowledge.

A. SANCTUARY ORGANIZATION

1. Management Structure

The Tidewater Administration of the Maryland Department of Natural Resources (DNR) is the lead agency for the Sanctuary Program. It is responsible for administering the federal Estuarine Sanctuary Program grants from the Office of Ocean and Coastal Resource Management, NOAA, and in-kind State matching funds. The Estuarine Sanctuary Manager, hired by the Tidewater Administration, serves as the liaison between the federal and State governments and assists all participants in the Program to carry out their responsibilities, especially with other.

Another key element to the Program is the advisory committee system. All necessary site-related concerns and information are reviewed by a Program management committee, and/or local interests through site advisory committees.

The Tidewater Administration operates the Sanctuary Program jointly with site owners, namely, the Smithsonian Institution (Chesapeake Bay Center for Environmental Studies), and the Maryland Wildlife Administration (Department of Natural Resources' Deal Island Wildlife Management Area). Site owners retain final land management responsibilities under this Program. Figure I-A shows the organizational structure of the Program.

a. /Estuarine Sanctuary Manager/

The Tidewater Administration employs a full-time Sanctuary Manager having oversight responsibility for all sites in the Program. The duties of the Manager include:

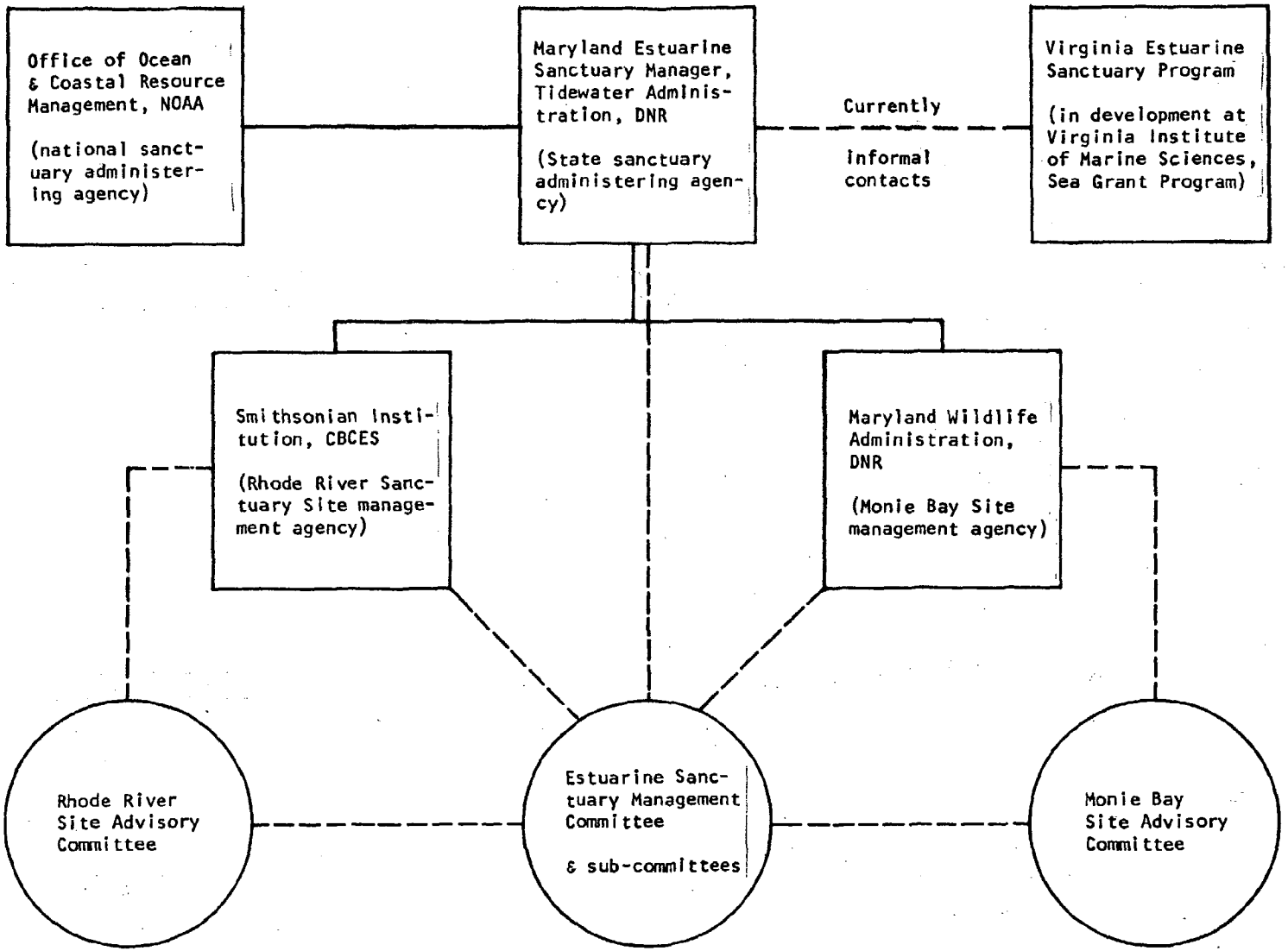
•Working with members of the Estuarine Sanctuary Management Committee and Advisory Committees as described below;

•Representing the Estuarine Sanctuary Program at all public meetings on behalf of the State;

•Advising and coordinating with universities, units of government, the

Figure I-A

ORGANIZATION CHART OF THE CHESAPEAKE BAY ESTUARINE SANCTUARY PROGRAM IN MARYLAND



KEY □ administrative organizations
○ advisory groups

NOTE: As additional sanctuary sites are designated, site managers and advisory com-

Virginia Sanctuary Program and non-governmental agencies on issues, questions, and projects that affect the Sanctuary;

•Coordinating special studies and research activities within or related to the Sanctuary and interpreting and sharing research results;

•Coordinating the educational programs for the Sanctuary;

•Coordinating the Sanctuary research program with the University of Maryland's Sea Grant Program, Center for Environmental and Estuarine Studies, Chesapeake Research Consortium, and other relevant programs, especially governmental Chesapeake Bay research programs;

•Carrying out duties related to administration of the Sanctuary, including preparing required State and Federal grant applications, proposals, budget, reports, and maintaining necessary support information; and

•Hiring and training staff to carry out specific duties which may be necessary.

b. /Estuarine Sanctuary Management Committee/

The Estuarine Sanctuary Management Committee (ESMC) provides advice to the Tidewater Administration and Site Managers on all aspects of Program Management.

Members are appointed by DNR and serve for terms of at least one year. They represent Bay research and educational interests, and local property owners or users from the site advisory committees.

The following categories are represented on the Committee: a representative from the Rhode River Site Advisory Committee; a representative from the Monie Bay Site Advisory Committee; the University of Maryland Sea Grant Program; the Chesapeake Research Consortium; the Smithsonian Institution; the Maryland Tidewater Administration; the Maryland Science Center; the University of Maryland Center for Environmental and Estuarine Studies; the Maryland Wildlife Administration; the Coastal Resources Advisory Committee; the Maryland Department of Education;

the National Aquarium in Baltimore; the Chesapeake Bay Foundation; and the Office of Ocean and Coastal Resource Management (Ex Officio). The ESMC may suggest alterations to its composition as it deems necessary and make that recommendation to DNR.

The principal role of the committee is to advise the Sanctuary Manager on Program administration. It makes recommendations based on policy and guidelines in this document in the following areas:

*Integrating proposed policy or guideline changes (i.e., from a site advisory committee) into the Estuarine Sanctuary Management Plan;

*Recommending well thought out, and fundable research and education studies or activities to take place at the sites;

*Contributing perspective and knowledge about Chesapeake Bay conditions, programs and needed activities which should be considered in the development of annual Sanctuary Program plans, particularly in assessing any new role or tasks which might be appropriate for the Program;

*Reviewing allocations proposed under the Sanctuary budget;

*Assessing the appropriateness of any proposed site boundary changes;

*Responding to any site advisory committee recommendations on user conflicts, and, if necessary, trying to resolve them in a balanced manner; and

*Recommending sites for inclusion into the Program.

Under its initial organizational structure, the ESMC has no elected or appointed chairman; it functions with the Sanctuary Manager chairing meetings. The ESMC uses education, research and site selection subcommittees for thorough review of its major tasks. They then generate recommendations for full committee consideration. The Site Selection Subcommittee, for example, assists DNR in the review and selection of other Sanctuary sites. Members are primarily from the Estuarine

Sanctuary Management Committee, supplemented by others suggested by the Sanctuary Manager or the ESMC, who can contribute to the process of evaluating and applying the criteria for site selection. The committee helps screen candidate sites and recommends to the ESMC its priority ranking for designation by DNR.

c. /Site Advisory Committees/

Each Sanctuary site has its own advisory committee (SAC) composed of approximately 12 members. They represent the local community and include adjacent property owners and users such as fishermen, boaters, hunters, waterskiers, and birders.* The agencies managing the sites also participate on the committees. Members are appointed by DNR based on recommendations from interested citizens and organizations. Responsibilities of the SAC include the following:

•Review when necessary, the impact of existing or proposed local land and water uses on the integrity of the boundaries of the Sanctuary site;

•Review any local problems arising due to the Sanctuary's educational or research programs;

•Suggest ideas for research and educational projects that are of value to the local community;

•Attempt to resolve user conflicts with site activities, if appropriate; and

•Review the progress of the site plan, including the effectiveness of Sanctuary policy and guidelines.

The SAC makes its recommendations to the Estuarine Sanctuary Management Committee through its ESMC representative, and also to the Sanctuary Manager at its meetings. Members inform their constitutents of relevant issues as they are identified, and committee actions.

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*See Appendix A for listing of advisory committee members.

The SAC generally selects a chairman and operates by consensus, although each committee organizational structure may vary somewhat. Meetings are held on an as-needed basis and at least quarterly.

2. Legal Authorities/Memoranda of Understanding

For each Sanctuary site, a Memorandum of Understanding (MOU) that serves as a legally binding contract is established. It is made between the Tidewater Administration and the owner of the site property, whether that is a local, State or federal agency, or a private individual. The MOU describes in detail the relationships between the parties, with information on: detailed uses of the Sanctuary; the boundaries of the Sanctuary; any titles, if needed; the facilities that have become a part of the Sanctuary; the conditions of financial assistance and other arrangements; the operation, maintenance and uses of any facilities built or to be constructed; the administration of the Sanctuary; the process for any dispute resolution between the two parties; possible causes relating to termination of the Sanctuary; and any other legal requirements upon which there must be agreement.

3. Multiple Site Management

When completed, the Chesapeake Bay Estuarine Sanctuary Program in Maryland will consist of at least four sites. Each site is to have its own research, education and area management elements, which, together, meet the total goals and objectives of the Program.

Sites are selected on the strength of resource attributes and practicality in achieving Program protection at the site. The potential for accomplishments is also considered. Each site operates under an annual plan set up in complementary fashion to the other sites and consistent with Program guidelines. Each site has its own permanent manager and advisory committee. Although the site selection approach continues to evolve for the remaining sites at this writing, Section B, which follows, sets forth the method and results from designating the

first two sites and extending the search for two more.

Section C describes the essential components required in site management, with emphasis on the significant aspects of site plans.

B. SITE SELECTION

1. Ecological Zones of the Bay

The Chesapeake Bay is one of the most productive bodies of water in the world and is the largest estuary in the contiguous United States. The Bay has long been appreciated for trade, seafood, waterfowl, recreation, shipping and scenery. It has been estimated that the Bay's biological productivity translates into a yield for fisheries of over three quarters of a billion dollars a year.

a. /Bay Management Issues/

Protecting these values, together with others such as hunting, boating, and aesthetic appreciation depends upon maintaining the Bay's environmental quality. Among the readily identifiable threats to its quality are increasing deposits of sediment in subestuaries and the Bay ; contaminated runoff from developed land leading to closure of shellfish beds; encroachment of development on important natural areas; degradation of water quality; and depletion of waterfowl populations and endangered species.

These are major issues that underlie Maryland's decision to establish an Estuarine Sanctuary Program. They are important because the northern half of the Bay, comprising most of the fresh and brackish waters, is within Maryland's borders. This area contains some fifteen to twenty sub-estuaries, several major sounds and bays, and hundreds of tidal creeks. This diversity of Bay communities needs continued research and understanding for achieving sound management and protection.

b. /Ecological Characteristics of the Bay/

Estuarine Sanctuary site selection criteria were derived from an examination of the Bay in terms of its major ecological characteristics. The principal characteristics that determine ecological conditions in the Bay were found to be:

1) Salinity of estuarine waters (a key determinant of the distribution of biological communities);

2) Topography and extent of marsh zones (generally western shores have hilly terrain with narrow marsh zones; middle and lower eastern shores are flat with broad marshes); and

3) Differences in water circulation (different mixing rates of fresh and salt waters creating different habitats for biological communities).

Through analysis of these conditions, a "zone" site selection concept emerged, and upper, middle and lower middle zones were defined. Precise delineation of the zones were not pursued because of significant fluctuations in principal characteristics such as salinity. Figure I-B represents an approximation of these zones.

The zone concept is based on the finding that multiple sites are needed to achieve the goal of the Estuarine Sanctuary Program. By establishing a Sanctuary site within each strategic ecological zone, Maryland would be able to contribute to a more holistic understanding of the Bay. This may be accomplished through:

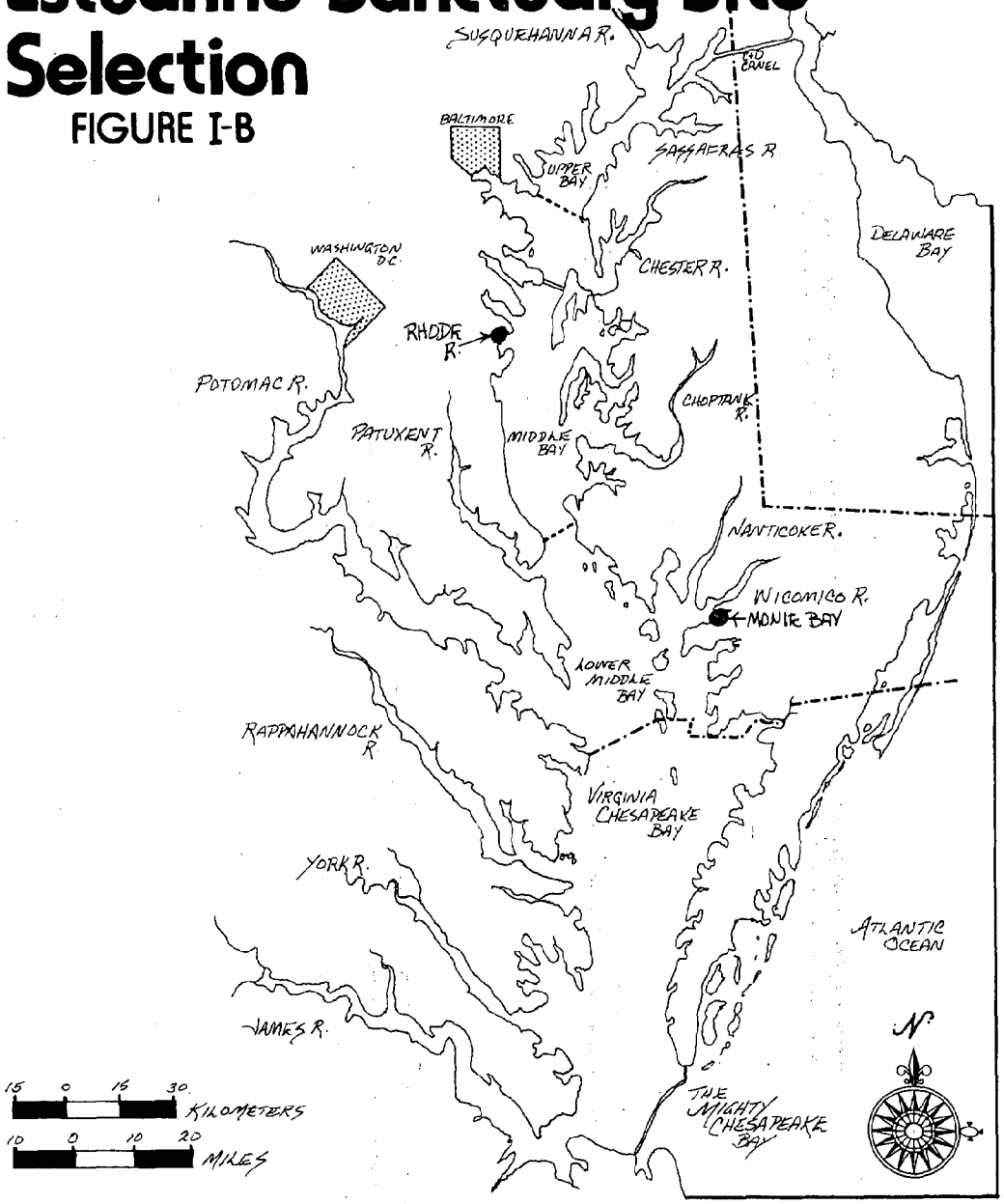
*Development of complementary programs that permit comparison of research results in various ecological communities from different sites;

*Selection of educational and research programs that make the most of specific site characteristics and avoid unnecessary repetition of effort in similar site conditions elsewhere;

*Identification of sites in zones without existing research or educational programs (e.g., Upper Bay);

Ecological Zones for Estuarine Sanctuary Site Selection

FIGURE I-B



*Spur additional research interests in new sites through demonstration of completed research projects at established sites; and

*Promote information exchange of research at comparable sites to advance research elsewhere.

The multiple site approach provides researchers with a unique opportunity to work within a larger framework, where coordinated activities at other sites allows comparative analysis rarely offered. A researcher has the opportunity to independently design a research program that can combine activities in a variety of estuarine communities. The long-term duration of the Sanctuary allows years for comparative analysis. Also, as research activities expand, the potential for coordinated studies between researchers or institutions increases.

2. Site Screening Process

The multiple site approach was taken as it became evident that it was impossible to adequately produce an accurate picture of the Chesapeake and its tributaries through one estuarine sub-system. The search for Sanctuary sites originally produced over 200 candidate places representing various Bay systems. They were first examined for wetland types, surrounding physiographic features, land use and overall environment, which together indicated the type of system present. As these subembayments were identified, additional systems were considered. Islands and marshes occurring on shoaling edges of meanders of large tributaries were especially reviewed when they exhibited noteworthy conditions of salinity, geology, wildlife, vegetation and land use.

The search for ideal, functional Bay sub-systems was supplemented with management considerations essential to the acquisition, preservation and operation of specific sites under the Sanctuary Program. A balance was sought between current and potential disturbances to the sites. This included identification of acceptable human uses and the ability to keep the integrity

of the systems intact by checking development pressures at the boundaries. Economically, each candidate site also had to be realistically assessed for ease of acquisition; financial ability to preserve a large enough area to do research, yet be manageable with available resources; and the proximity to other educational and research facilities. Finally, the sites had to be compatible with surrounding land uses and have the support of the community.

a. /Site Evaluation Criteria/

In the first designation round, nineteen sites were reviewed and evaluated by a State Steering Committee. The following criteria were used to evaluate the sites:

1) Presence of a complete system--estuary, wetlands and uplands;

•Presence of a tributary on the site, ideally with the tributary within site boundaries;

•Wetland area comprises a significant percentage of the site area;

•Presence of a salinity gradient along the estuarine portion of the site;

2) Relative lack of disturbance on the site and/or compatible land and water use within the watershed;

3) Suitability of the site for educational and estuarine research activities;

4) Representative of larger portions of Maryland's Chesapeake Bay estuarine system;

5) Presence of endangered species within the site;

6) Proximity of site to other State or federal protected natural areas;

7) Diversity of habitats within site boundaries; and

8) Acquisition cost and impact on property owners.

b. /Site Selections/

The selection of the Muddy Creek portion of the Rhode River and Monie Bay was based on scientific criteria and management considerations. Acquisition became a very important, practical factor. Both sites comprised large public landholdings.

In the current designation round, the criteria have been modified. Less emphasis is placed on wetlands percentage or on a salinity gradient presence. A new criterian of diversity of habitats among sites has been added. The changes reflect an intent to actively pursue other estuarine systems, including large river shore systems, since marsh areas with agricultural watersheds are already well represented.

C. SANCTUARY PROGRAM DIRECTION

Each Estuarine Sanctuary site operates from a management plan. Its purpose is to assure site protection and provide direction for its use for scientific and educational purposes. Site plans describe how current site management, land uses and the area's research and education potential are brought together under the goals of the Estuarine Sanctuary Program. Site management plans are prepared as action documents to guide planning and other activities necessary for achieving Sanctuary goals. Site management plans provide the policies and guidelines necessary for covering three basic responsibilities:

- Annual site operations;
- Support for research and educational activities; and
- Acting upon consistence or compatibility issues.

1. Site Plans

Sanctuary Program activities place certain demands on site facilities and natural resources, and so an annual site plan must describe how to balance uses with impacts. A planning strategy for the first year should be included in new plans, addressing all significant concerns raised in acquisition of the sites. Site plans must be consistent with the land use articles of the Memorandum of Understanding between DNR and the landowner, and the Maryland Coastal Zone Management Program.

Responsibilities for legal documentation required, staffing and budgeting, and project reviews are to be addressed in the annual plans.

2. Research Objective and Proposal Criteria

Research activities encouraged and supported by the Program at its sites are expected to enhance our understanding of Bay systems and contribute

to the use of estuarine data in resource decisions. The criteria used in the evaluation of proposals for research at Sanctuary sites include:

*Activities uniquely suitable to be performed by one or combination of sites;

*Activities that, by their nature, require comparative research at more than one site;

*Activities at a site that would uniquely complement existing research at a site elsewhere;

*Activities that are dependent on the long term nature of site designations;

*Development of information of exceptional long-term value;

*Research which is compatible with Sanctuary goals for contribution to management, preservation, education, and research;

*Research which contributes to fundamental understanding of the entire Bay; and

*Research which will improve public understanding of the particular functions and contributions of estuaries.

These criteria provide the framework which can be used to determine research most appropriate under the Program. They are not intended to limit existing research carried out at the sites. Insofar as they do not interfere with Sanctuary integrity (e.g., are not destructive of the resources), and do not preclude other Sanctuary uses, other research activities at the sites are permitted. Research activities under the Sanctuary Program are primarily intended to address already identified Chesapeake Bay needs.

The range of uses to which the Program site system may be put in the next 5-10 years is exemplified by the Chesapeake Research Consortium's draft report, "Summary of Ratings of Topics in Research and Monitoring" (1982). It is an

evaluation of research priorities by Bay academicians, managers and practitioners who may be also expected to be principal users of the Sanctuary Program. Six of twelve categories in which this report states research is needed in the coming years exhibit potential for Sanctuary Program involvement. These include:

- Fisheries and Wildlife
- Transportation
- Waste Placement
- Monitoring
- Preservation
- Fundamental Research

Appendix B represents, in summary form, suggested research activities under these six categories. The Estuarine Sanctuary Program is guided in the use of its funds, and other major commitments of research resources, by such Bay research priority topics.

2. Education Objectives and Project Criteria

The Program's educational purpose is to mobilize the educational opportunities specific to Estuarine Sanctuary sites, making the most effective and efficient use of existing and potential estuarine educational resources. Such a program requires close cooperation with educational efforts already in place throughout the Chesapeake Bay region.

The education program uses existing information about estuaries and communicates that information to a variety of audiences in order to promote a better understanding of estuarine ecology and processes.

a. /Objectives/

It is the objective of the education program to provide comprehensive, multi-site estuarine education activities which focus on learning about the Chesapeake Bay ecosystem. Site-specific activities are tailored to reflect

individual site characteristics.

It is also an objective to add to the greater appreciation of all of the nation's estuaries through an understanding of how the Chesapeake Bay serves as one model of estuarine systems.

To carry out its objectives, the education program includes the following:

1) An Estuarine Education Needs Assessment, to develop information from which the Estuarine Sanctuary Program can make a unique and complimentary effort to assist existing education efforts. It helps assure non-duplication and provide focus for filling gaps in programs which emerge. It also serves as the basis for coordinating with educational programs and institutions such as the Sea Grant Program, University of Maryland Center for Environmental and Estuarine Studies, the Smithsonian's Chesapeake Bay Center, the Chesapeake Bay Foundation and the National Aquarium;

2) Educational Programming, which maximizes use of sites for hands-on learning, guided tours, resource materials for on and off site use; use sites for teacher training efforts; and provides programs for special groups i.e., gifted students, handicapped individuals and user groups, such as hunters;

3) New Programming and innovative methodologies with evaluation and assessment techniques;

4) Opportunities To Expand Public Understanding of estuarine management so that estuarine ecology study can be combined with an appreciation of wise resource use;

5) In time, A Comprehensive Estuarine Education Module developed as a result of the varying educational programs at the multiple sites. Each site's contribution varies from that of the other, based on available staff, facilities, funds and interests. Field educational experiences are to be available at sites where access and/or educational facilities are provided;

opportunities for teacher training programs or slide shows are to be offered at sites with limited educational staff or facilities.

Within these broad objectives, each Sanctuary site tailors specific programs suited to its own special characteristics. The precise nature of on-site activities depends a good deal on site specific goals and capabilities determined by the site education staff, the Sanctuary Manager and the Site Advisory Committee. In some cases, materials are appropriate for all sites, as in the slide show about the Chesapeake Bay which may be produced by the National Aquarium in Baltimore. Further, each site has its own approach to education in conjunction with site development and visitation policies.

b. /Criteria for Educational Project Selection/

The education program takes advantage of the multiple site concept. As sites are added, one of the criteria for selection of a new site is whether it can add to or compliment the existing educational activities in the Program.

To be selected, an educational project must enhance and carry out Program goals, be non-duplicative and maximize the potential of each site. Where possible, educational activities should be coordinated with research activities at a site. Site Advisory Committees are to be made aware of all potential projects and have opportunities to comment on them.

3. Sanctuary Administration

Administering the Chesapeake Bay Estuarine Sanctuary Program requires putting research and education objectives into actions which employ the multi-site system. The Program niche in Chesapeake Bay management is to support needed investigatory work and learning opportunities by providing sites preserved for these activities. Long-term, practical use of the system depends upon involvement of professionals and others who affect the strategy of Bay research and education. A successful Program is one in which State, federal agencies, and

academic institutions with research and education roles in Maryland's coastal zone use these areas as their own field laboratories.

The Estuarine Sanctuary Program can help Bay agencies and institutions meet their research and educational objectives in ways perhaps not otherwise practicable or possible. Program sites may be compared to other areas around the Bay during times when institutions plan field work. To do this, Program staff provide support services to research and education community institutions, such as:

- Undertaking public relations activities that show Sanctuary Program relevance and capabilities in combination with other programs;
- Participating on behalf of the Program to advance complementary objectives at the State or higher levels; and
- Seeking funds for joint opportunities which bring new research and educational work to the Program and the Bay region.

a. /Conducting Educational and Research Activities at Sites/

The Estuarine Sanctuary Program is an inducement to bring high quality research investigations and educational opportunities to representative, preserved areas of the Chesapeake Bay system. Qualified activities are guided by procedures developed at each site that assure coordination takes place at the important stages of project operations.

Basic procedures include:

1) A method for applying for use of sanctuary site/s. Applications should include a use schedule of Sanctuary facilities and equipment as well as a plan of proposed activities. Approved applications become use permits. Site Manager/s and project leaders are responsible to work out any potential conflicts regarding use of the site, i.e., potential conflicts with concurrent site activities or impact of activities on site resources. Any qualifications to the basic permit are to be in writing.

2) A method for monitoring activities and reporting on completed activities. All site activities are reviewed at least quarterly in keeping with a requirement for reporting to NOAA every three months on the status of the Estuarine Sanctuary Program. Where activities extend beyond the Program year, a year-end status report is prepared for inclusion into the Program annual report to NOAA. A final project report must be submitted to the Site Manager within an agreed upon time after completion of all activities.

3) Resolving problems during the life of the project. Necessary changes in the activities plan or use schedule must be agreed to by the Site Manager. Site issues arising from such changes, e.g., encroachment of other site activities, are to be settled by the Site Manager.

b. /Consistency Determinations/

Because there are a number of sites participating in the Program, each with somewhat different approaches to estuarine resource management, various sites can take on different research and educational roles, rather than each trying to achieve all Program objectives. This involves focusing on the best uses for each site as well as the complementary, total research and education capabilities needed to sustain the whole Program.

Under this approach, site management plans specifically address the compatibility of Program research and education objectives to existing land and water uses at the sites. In addition, the compatibility between Program plans and local activities are presented. Site management plans also include public access and site preservation policies. In general, sites selected already have acceptable public access policies and can protect the integrity of their boundaries. Any needed contingencies are built into the annual site plans. An example is provision for the long-term management of archeological sites in a Sanctuary.

D. CONCLUSIONS

1. Program Strategy

*The Estuarine Sanctuary Program is intended to be an important arm of the research and education communities in the Bay region, offering permanent sites at which to conduct baseline work and other investigations or learning experiences for virtually all levels of public interest.

*The Program will include at least four sites, possibly more. These sites will be areas of somewhat different habitats, ecosystems and land uses. Together, the approach to Sanctuary research and education is a concept understandable to the public and adds to the needs of Bay management organizations.

2. Program Structure

*The Program management structure provides both site staff and advisory committees. The Sanctuary Manager and the Estuarine Sanctuary Management Committee coordinate site activities under a unified Program plan. They also help assure the usefulness of the Program by their participation in discussions, planning and the pursuit of funds affiliated with Bay research and education needs.

*The Sanctuary and Site Managers have joint responsibility for administering the Program at the sites, especially in making consistency decisions, approving major activities, etc. which require the action of more than one principle agency.

3. Program Planning

*The overall management plan and site plans key site agency management commitments with the goals, objectives and activities agreed to under the Sanctuary Program. Funded education and research projects and other activities

must be directly related to Program intentions expressed in the plans. Other related activities, in so far as they are not inconsistent with the plans, are encouraged. Acceptable land use controls are in place.

E. RECOMMENDATIONS

1. Program Strategy

*The Estuarine Sanctuary Program should base its identity on the establishment of inter-related and strategically located sites. Their contribution to meeting Bay research and education objectives is of particular importance.

*The sites should be able to sustain permanent management programs independent of the relatively low Sanctuary Program financial capabilities.

*Innovative approaches should be considered in completing the multi-site selection portion of the Program. Strong consideration should be given to including main-stem Chesapeake Bay waters, in addition to tributary watersheds. This appears especially crucial to assuring a sound research footing for the Program.

*Fund raising efforts by the Sanctuary Manager and the Estuarine Sanctuary Management Committee should be essential tasks the first year. This will assure sites are used productively, and that realistic growth of the Program overall can be pursued as opportunities appear. Fund raising must also contribute to the objectives of Bay-related research and education organizations as a result of aligning or supplementing their studies with the Sanctuary Program.

2. Program Structure

*The Estuarine Sanctuary Management Committee and the Site Advisory Committees, crucial in the development of the Program, should be permanent fixtures, dealing with the policy side of research, education, site protection and overall Program direction.

*Where Program activities are significant, quarterly and annual reports listing the type of activities, results, significance for management, new directions, etc. should be prepared. A summary of special

problems and future activities should also be included.

3. Program Planning

*The first annual overall Program plan and site plans should be prepared with the cooperation of all agencies and committees involved in Program development. The overall plan especially would be distributed and reviewed widely in the region to enhance public awareness of the Program's intentions, and to obtain refinements which can contribute to the success of the Program. Sanctuary support staff should acquire a working understanding of the research and education needs of the Bay and use that knowledge to help pertinent organizations achieve their objectives by using the Sanctuary sites as their own laboratories where such facilities are otherwise unavailable.

*Coordination of site locations and annual activity planning with the State of Virginia is necessary so that the two Programs can respond to interstate needs.

*Research and education procedures (i.e., permits) and priorities at each site need to be coordinated Program-wide so multi-site activities, as well as activities from year-to-year, can be carried out efficiently.

*The site management agencies should continue to enforce their rules for visitor use and resource protection through education rather than law enforcement channels wherever possible.

*Access for the general public at Sanctuary sites should be provided for where possible, realizing however, the constraints of individual sites to accommodate visitors.

*Conflict mitigation between apparently incompatible uses at sites, i.e., between research and education proposals, should be pursued before any Program policy is set.

(cut along this line for mailing purposes)

F. REVIEWER'S WORKSHEET FOR THE CHESAPEAKE BAY ESTUARINE SANCTUARY PROGRAM IN MARYLAND, MULTIPLE SITE PLAN (DRAFT)

1. Plan Goals and Objectives:

   Comments

   _____

   _____

   _____

2. Sanctuary Organization:

   Comments

   _____

   _____

   _____

3. Site Selection Rationale:

   Comments

   _____

   _____

   _____

4. Sanctuary Program Direction:

   Comments

   _____

   _____

   _____

5. Conclusions:

   Comments

   _____

   _____

   _____

6. Recommendations:

Comments

_____

_____

_____

7. Overall/Other:

Comments

_____

_____

_____

8. Level of Plan Support: (May I contact you about problems you raise?)

Yes ☐ No ☐

I/We support the Plan in its present form.

I/We support the Plan with modifications:

_____

_____

_____

I/We do not presently support the Plan because of these problems:

_____

_____

_____

Name _____(affiliation)_____

Address _____

Telephone _____

PLEASE RETURN TO: Scott Brumburgh, Estuarine Sanctuary Manager
Tidewater Administration
Md. Dept. of Nat. Res., Tawes Bldg., C-2
Annapolis, MD 21401 tel: 301/269-3382

DEADLINE FOR COMMENTS: ~~March 31~~ May 30, 1983

CHESAPEAKE BAY ESTUARINE SANCTUARY PROGRAM IN MARYLAND

RHODE RIVER SITE MANAGEMENT PLAN

INTRODUCTION

The lower Rhode River watershed is a subestuary of the Chesapeake Bay's Western Shore. The Sanctuary site includes the Muddy Creek tributary and is located within the bounds of the Smithsonian Institution's Chesapeake Bay Center for Environmental Studies (CBCES). Sanctuary designation adds new research and educational capabilities to an already prestigious estuarine program, and provides another level of protection to the site's wide variety of aquatic and terrestrial habitats.

It is expected that the combination of existing and new research will assist State coastal management decision-making. CBCES's innovative education program, focusing on estuarine education methodology, can enhance national, State and local efforts to promote better public knowledge of our estuaries. This work will be shared with other estuarine areas in the region that need new information and processes for resolving conflicts and/or mitigating adverse impacts caused by man's activities in coastal areas.

Significant background work went into the selection of Rhode River as a site by the State of Maryland and the U.S. Department of Commerce, NOAA, in 1981. The document produced as a result of that effort, the Final Environmental Impact Statement: Chesapeake Bay Estuarine Sanctuary, (FEIS) including history and data on the site, is not repeated here.

A. BACKGROUND

1. Site Selection Overview

The Rhode River Sanctuary site typifies the middle Maryland Bay in ecological terms, especially with regard to water circulation (the mixing rate of fresh and salt water), salinity and terrain- hilly, with narrow marshes. The site offers the features basic to a functional Bay sub-system. It provides the wetland types, surrounding physiographic features, land use and overall environment, which together constitute a watershed system. It also meets the management conditions essential to the acquisition, preservation and operation of a site under the Program. This includes maintaining a balance between current and potential human use disturbances, and the ability to keep the integrity of the ecological system intact to the boundaries.

This site was selected from among a number of candidate areas, based on six ecological criteria.

Ecological Basis for Selection of
Rhode River as an Estuarine
Sanctuary Site

- Presence of a complete system

The Sanctuary is part of a protected, almost complete, system. CBCES property comprises much of the Muddy Creek watershed, although not all. The Smithsonian Institution, however, does have some land use restriction agreements with surrounding land owners. These are considered presently compatable with current CBCES purposes, assuring protection of the watershed.

- Minimal disturbance/compatable land use

Once a tobacco farm, the Sanctuary site now contains significant areas of vegetation undisturbed for a generation and more. Activities allowed are strictly limited to research and education; no active

land or wildlife management activities, or consumptive/recreational uses, are permitted.

•Suitability for research and education

The variety of cropland, freshwater, saltwater marshland, estuary, woodland and forest in various stages of succession provide diverse conditions for ecological research and education. In recognition of this high potential, the Smithsonian land encompassing the Sanctuary was named an experimental ecological reserve by the Institute of Ecology in 1979.

•Representativeness of a larger Bay area

The site contains areas representative of high and low brackish marsh, and freshwater tidal - nontidal marsh the upper middle Bay. It is a site typical of Western Shore areas with narrow borders in upper creeks and broader areas close to the Bay. The upland forested areas of the site provide relatively undisturbed areas of Tulip Poplar Association, typical of this region.

•Presence of endangered or threatened species

Upland species using the Sanctuary include the Bald eagle.

•Diversity of habitats

Both marsh and upland habitats represented include a wide diversity of vegetation species.

2. Site Boundaries

The land boundaries of the Sanctuary site are contained within the lands owned or held in public trust by the Smithsonian Institution at CBCES. Upstream water boundaries for this site include most of Muddy Creek tributary up to Muddy Creek Road. The downstream boundary lies along a point from

Fox Point to the western shore of Boathouse Creek.

Composition of Real Property

Rhode River Estuarine Sanctuary Site

Owner	Size in Acres
Smithsonian Institution (including land to be donated to Maryland)	2,635
State of Maryland (water only)	90
Total	2,275 acres

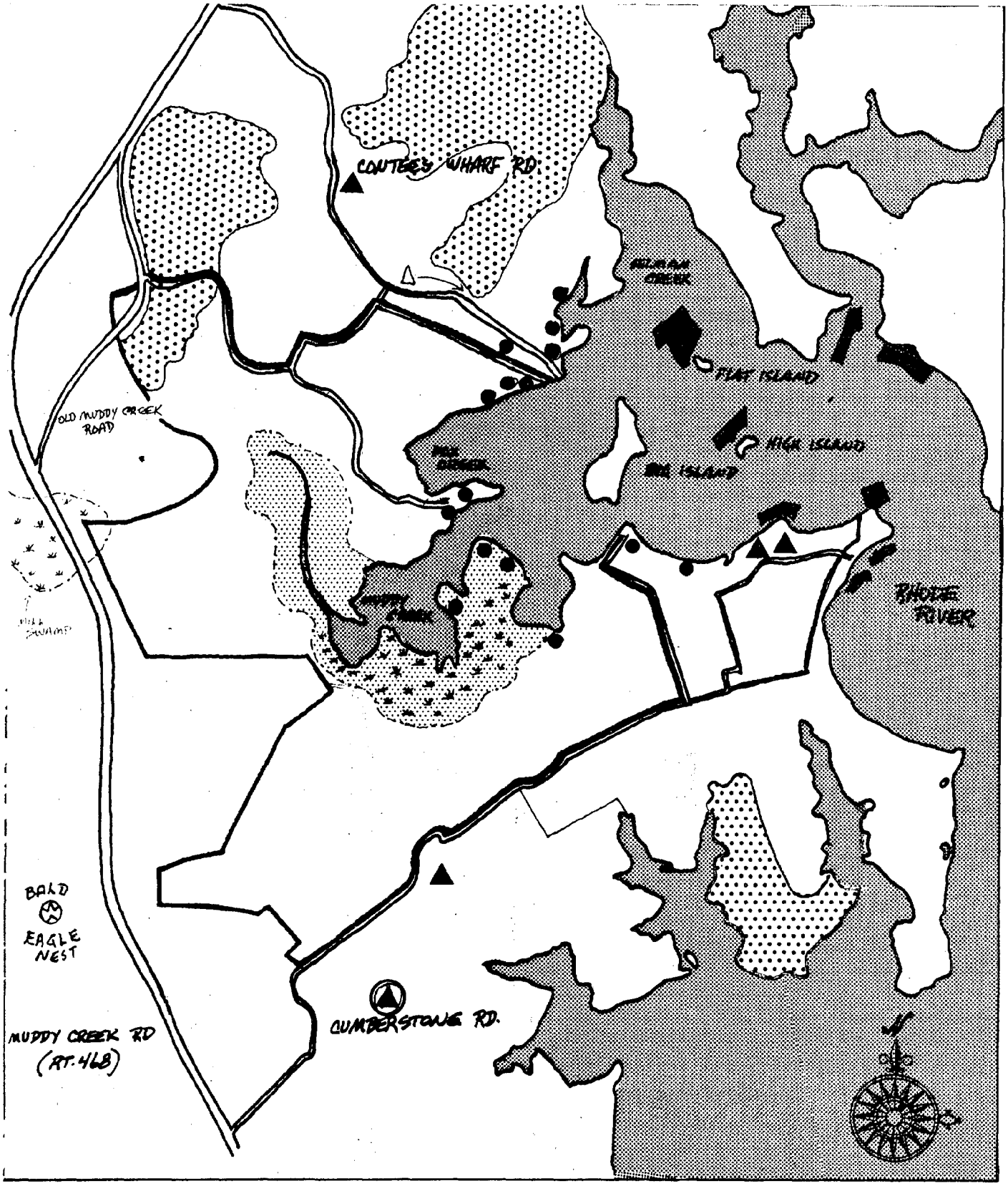
3. Affected Environment

An assessment of the site's natural and human environment, current conditions, impacts associated with having a Sanctuary Program, and compatibility with other plans in place is presented in the FEIS on Pages 38-43 and 52-55.

4. Location of Significant Site Land and Water Characteristics

The Sanctuary site comprises 2,275 acres of estuary, creeks and uplands within the Muddy Creek drainage basin the Rhode River ecosystem. Figure II-A locates the boundaries and significant resources within and adjacent to the Sanctuary.

The major natural land and water features of the site, as well as important uses to which the area is put by man, are described under uplands, wetlands, estuary and surrounding land use.



RHODE RIVER RESOURCE MAP

FIGURE II-A

- ▲ HISTORIC SITES RESIDENCES
- △ HISTORIC SITES RUINS
- ◭ NATIONAL REGISTER SITES (RESIDENCE)
- ● ARCHEOLOGICAL SITES
- SANCTUARY SITE BOUNDARY
- MARYLAND UPLAND NATURAL AREA
- WETLAND
- FRESH WATER MARSH
- PRIVATE OYSTER BARS: OPEN OCT. 1982

SCALE IN FEET

0 600' 1200' 1800'

a. /Uplands/

In general, vegetation at this site is classified Yellow Pine Hardwood Forest Region.* It is close to the transition between the Yellow Pine - Hardwood and Oak - Yellow Poplar Regions and is listed as Tulip Poplar Association. Tulip Poplar is the most ubiquituous species with common associates begin Red maple, Dogwood, Virginia creeper, Black gum, White oak, Sassafras, Black cherry, Mockernut hickory, Southern arrowwood and Japanese honeysuckle. Major vegetation types range from deciduous forest to coniferous forest; from areas in advanced succession to areas in initial stages of secondary succession; from cropland, ponds, salt and freshwater marshes, to residential lawns.

The Maryland Uplands Natural Areas Study (1979) specially cites upland forested areas in the vicinity, one within the Sanctuary grounds. These areas are shown as Maryland Upland Natural Areas in Figure II-A. Other unique resources include a Bald eagle nest directly adjacent to the south-western boundary of the Sanctuary.

The Sanctuary is located in a long-established agricultural community. This heritage is recognizable through the presence of scattered residences, estates, graneries, dependencies and ruins of historical buildings surrounding the Sanctuary. There are some ten or eleven buildings within a very short distance of the site boundary.

b. /Wetlands/

The site contains mostly brackish high and low marshes. Some tidal freshwater marsh is present. One large nontidal freshwater swamp (Mill Swamp) is located at the western boundary of the site, centered on the South Fork of

---

*Classification of Maryland Vegetation (Grace Brush, et.al. 1976).

Muddy Creek.

Table II-1 lists the dominant wetland species found at the site.

Table II-1

SELECTED VEGETATION TYPES PRESENT AT
RHODE RIVER SANCTUARY SITE

*SHRUB SWAMPS	
Red maple/Ash	Acer rubrum/Fraxinus spp.
*SWAMP FORESTS	
Red maple/Ash	Acer rubrum/Fraxinum spp.
Loblolly pine	Pinus taeda
*FRESH MARSH	
Smartweed/Rice cutgrass	Polygonum spp./Leersia oryzoides
Spatterdock	Nuphar advena
Pickerelweed/Arrowarum	Ponterderia cordata/Peltandra virginica
Sweetflag	Acorus calamus
Cattail	Typha spp.
Rosemallow	Hibiscus spp.
Wildrice	Zizania aquatica
Bulrush	Scirpus spp.
Big cordgrass	Spartina cynosuroides
Common reed	Phargmites communis
*BRACKISH HIGH MARSH	
Meadown cordgrass/Spikegrass	Spartina patens/Distichlis spicata
Marshelder/Groundsebush	Iva frutescens/Baccharis halimifolia
Cattail	Typha spp.

Table II-1 (con't)

SELECTED VEGETATION TYPES PRESENT AT
RHODE RIVER SANCTUARY SITE

Rosemallow	Hibiscus spp.
Switchgrass	Panicum virgatum
Big cordgrass	Spartina cynosuroides
Common reed	Phragmites communis
Smooth cordgrass	Spartina alternifolora
*BRACKISH LOW MARSH	
Smooth cordgrass	Spartina cynsuroides
Cattail	Typha angustifolia

Source: compiled from The Coastal Wetlands of Maryland, 1982, Table 44, p. 117; and Maryland Wetlands Maps, Water Resources Administration, DNR

c. /Estuary/

Commercial and sport fishing have a long history on the Rhode River. Although commercial catches have declined sharply in recent years, perch, rockfish and croakers are on landing records at nearby Galesville.

Oyster harvesting takes place at three privately leased beds east of the Sanctuary, on the eastern side of Big Island and along the southern shoreline to the east of the Sanctuary on Boathouse Creek.

Crabs continue to be abundant in the Rhode River as elsewhere in the Bay.

d. /Surrounding Land Use/

The perimeter area of the Sanctuary is predominately rural. The area is zoned Agricultural/Rural Residential, and contains several residential

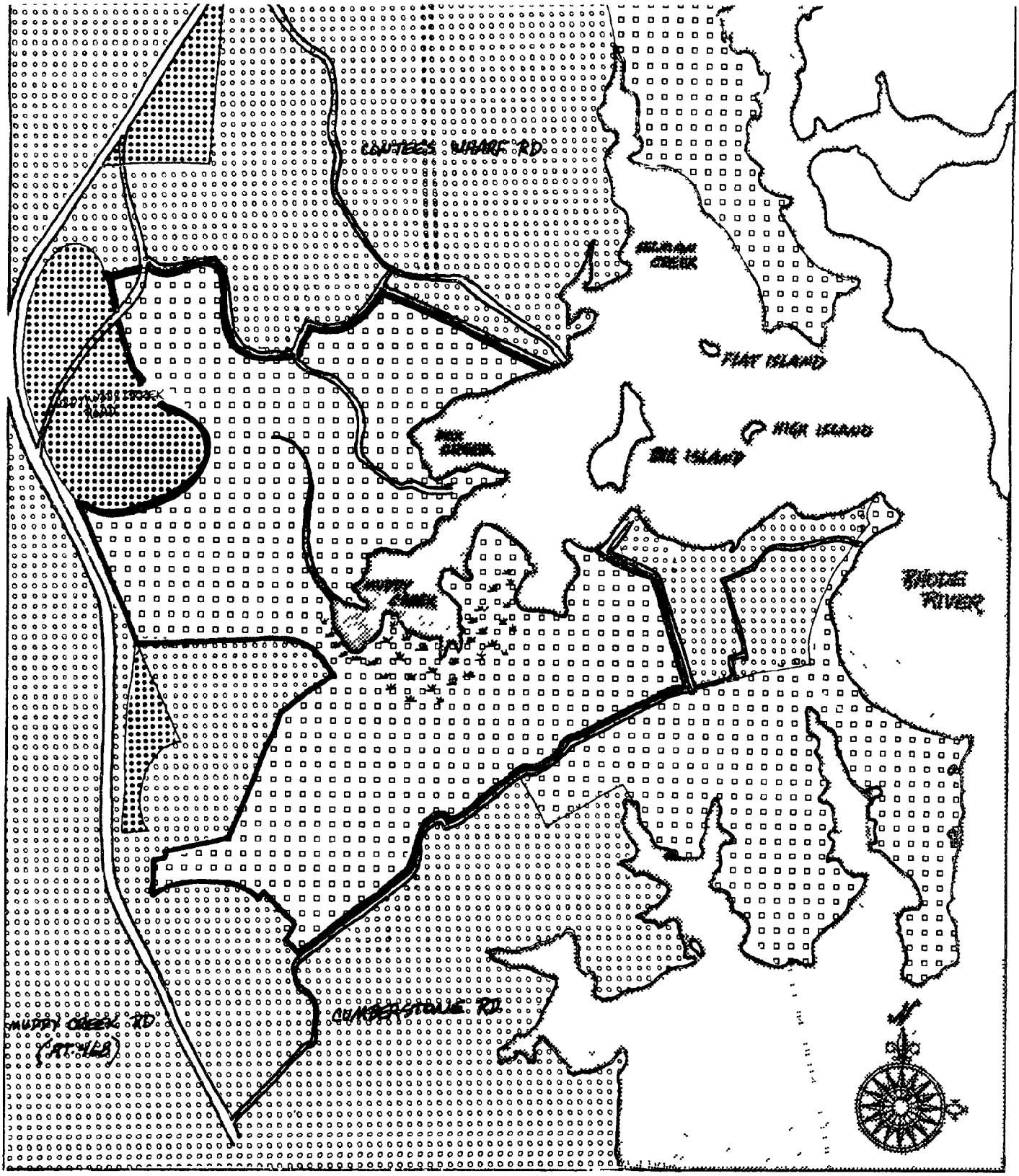
communities. The agricultural uses include row crops, field pastures, forests, orchards and non-forested wetlands. CBCES property itself is zoned Open Space. (See Figure II-B)

RHODE RIVER ESTUARINE SANCTUARY

ENVIRONMENTAL SYNOPSIS

A narrow estuary of relatively shallow water. Land composed of a sequence of interbedded sands, gravels, sites and clays deposited during interglacial conditions, forming low-lying banks and beaches.

- Climate - Continential type modified by Chesapeake Bay; maximum temperatures in July, about 89°; coldest period in January, 24°F.
- Hydrology - Rhode River watershed - Approx. 18 square miles Rhode River depth at mouth of Muddy Creek & Sellman Creek - 7", 13' at Chesapeake Bay
- Salinity range - slight; weekly range is 3.5 to 13.0 appt.
- Water temperature range - .7°C to 32.6°C
- Tides - Semi-diurnal; mean range of 1.5'; higher levels in March - Nov.



RHODE RIVER ZONING MAP

FIGURE II-B

- SANCTUARY BOUNDARY
- OPEN SPACE
- AGRICULTURAL-RESIDENTIAL
- RESIDENTIAL

B. SITE USE AND EXISTING PLANS

1. Present Site Facilities and Use Level

a. /Facilities/

Principal CBCES facilities which now serve their research and educational programs include: research offices, laboratories and support facilities, administration and education offices, a conference center/dormatory, parking lots, research plots, nature trails, a dock, main access and secondary roads. These are located in Figure II-C. The proposed new access road and new educational complex area for the Sanctuary are also shown.

b. /Present Use Level/

The current visitor traffic to the site is summarized in Table II-2 below.

Table II-2

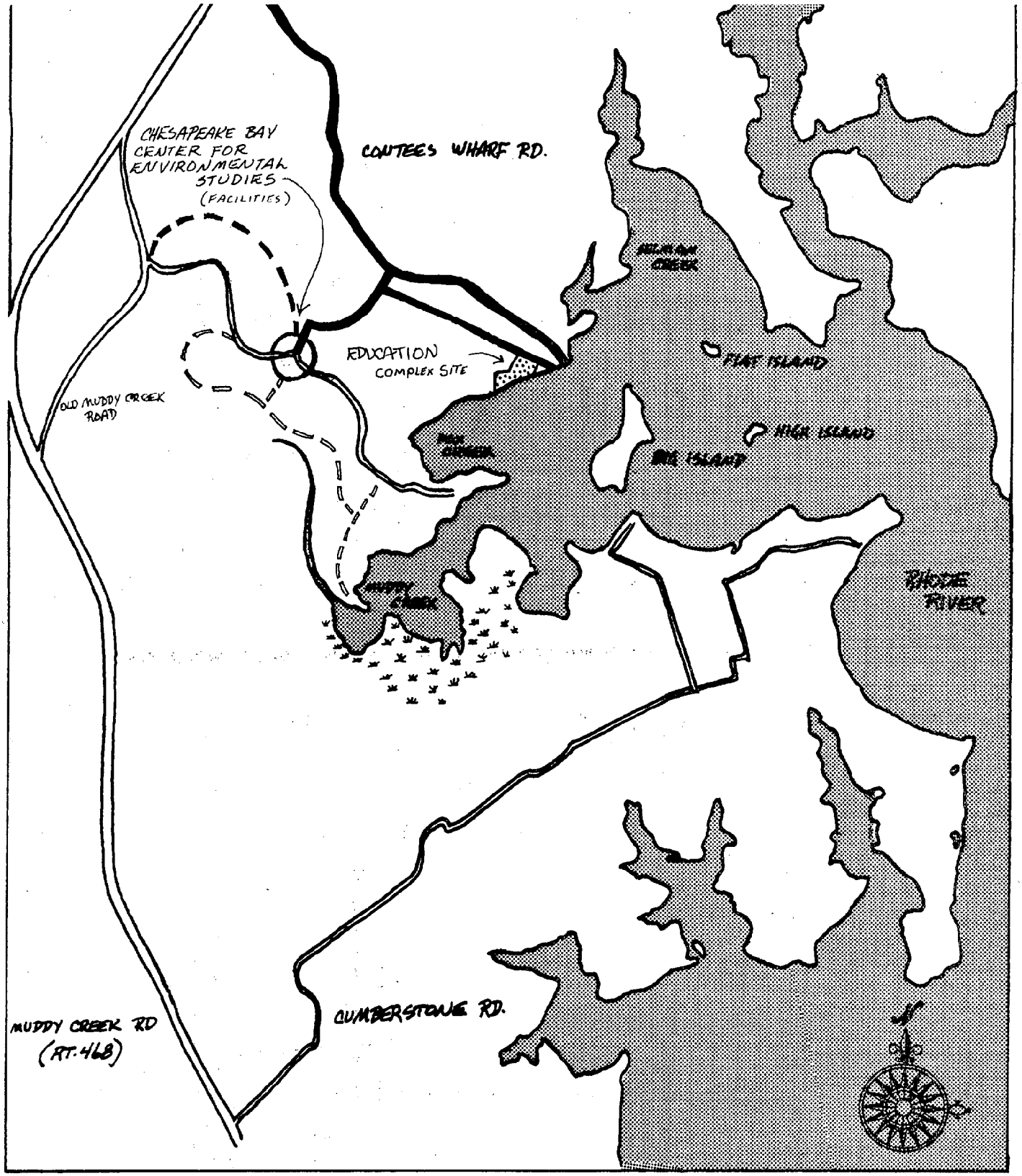
Chesapeake Bay Center for Environmental Studies
Visitor Use Oct. 1981 - Sept. 1982

a. Bay Activity

Activity	Persons Visiting
School tours	1600
Weekend tours	500
Workshops, conferences	1400
Estuarine education activities	200
TOTAL	3,630 visitors

b. Seasonal Daily Attendance On Site

User Group	Season	
	Winter	Summer
Scientists and technicians	20	20
Education, interest groups	12	20



RHODE RIVER FACILITIES MAP

FIGURE II-C

When averaged across the year, visits total approximately 10 per weekday, with a comparable level of weekend activity. Some seasonal variation in these approximate daily activities occurs.

2. Past and Current Research Activities

CBCES has a fifteen year history of research activity at the Rhode River. Their environmental research program has as its goal a better qualitative understanding of the ecological processes in that complex upland/estuarine system. The basic research approach is to conduct long term studies to:

- Develop a better descriptive understanding of this ecosystem;
- Formulate and test ecological theories; and
- Address selected applied problems.

Research activities are grouped into subprograms with strong emphasis given to interrelationships between programs.

a. /Watershed Studies/

The objective is to qualify the relationship between land use and runoff into estuarine receiving waters. Work has centered on quantifying the relationship between land use of habitats and runoff of water, nutrients, sediments, micro-organisms, and pesticides. Current activities include measuring and analyzing precipitation and monitoring of the Rhode River watershed and estuary using a system of eight automated monitoring stations. Research is also devoted to understanding how materials are processed as they move from the uplands through wetlands and mud flats, into the estuary. Future research activities will focus on mechanism responsible for nutrient processing and transport, and will include watershed manipulations.

b. /Estuarine Ecology/

The objective is to develop and test theories related to the organization and functioning of estuarine benthic, pelagic, planktonic and wetland communities. The intent is also to provide long-term monitoring of estuarine water quality parameters for data needed to interpret changes in the populations of estuarine organisms.

As part of a National Science Foundation supported watershed research program, extensive studies are also conducted on wetlands and large mud flat areas of the estuary. These studies are directed to understanding organic matter production, decomposition, and nutrient transformations, and the transport and exchange of nutrients, algae, bacteria, and organic matter between the wetlands and the estuary.

A major future effort will be directed towards obtaining a better understanding of the chemical, physical, and biological exchange processes occurring between Rhode River and open waters of the Chesapeake Bay.

c. /Upland Ecology/

The objective is to develop and test ecological theories related to the organization of plant and animal communities. Work to date has emphasized long-term comparisons of plant and animal populations in areas of varying successional maturity of different present or past land uses.

Future efforts include the testing of ecological theories of succession by conducting long-term studies on manipulated watersheds and on a recently completed transplant garden.

Past and current CBCES research programs and projects provide the starting point for developing a Sanctuary research plan, including research topics. The site record is relatively comprehensive and serves as an

illustration of research potential at Rhode River and other Sanctuary and non-Sanctuary research sites. Table II-3 presents past and current research correlated to the Sanctuary Program research categories identified in Chapter I.

The sources used in determining the list include:

- Research taking place at the site;
- Research on resources in similar conditions in the Chesapeake Bay; and
- State-wide or regional inventories of data that include the Sanctuary site.

3. Past and Present Education Programs

The Education Program at CBCES is concerned with understanding environmental effects on people, as well as providing mechanisms for improving learning. This is achieved through three subprograms: 1) research; 2) educational materials development; and 3) public programs. A primary emphasis for all programming is on learning that occurs outside of the formal (school) education system. Research is underway to better understand this educational milieu and, through materials development and public programs, to extend the quality and availability of informal learning experiences. In addition, CBCES conducts a number of higher education programs including a Work/Learn Program for undergraduate and graduate level students and post-doctoral fellowships.

a. /Research/

The CBCES education staff conducts basic and applied research in two general areas: 1) informal (out of school) learning; and 2) environmental physchology. A range of issues concerning what, how, and when learning occurs on science field trips to places like nature centers, museums, or zoos have been

Table II-3

Estuarine Sanctuary Related Research
Past And Current at the
Chesapeake Bay Center for Environmental Studies

MARYLAND ESTUARINE SANCTUARY PROGRAM RESEARCH TOPIC	CBCES RESEARCH ACTIVITIES/STUDIES
•Fisheries	•Predation of fish species on bottom dwelling invertabrates. •Long-term data on annual variations in juvenile fish populations using the estuary or nursery. •Population studies of the reproductive success of semi-anadromous fish species; investigation of success of individual species in spawning; life history strategies and links to meterology, salinity and water quality conditions; study of homing insticts of separate species and mixing with adjacent fish in the Bay.
•Wildlife	•Ten years of waterfowl census at selected sites on the Rhode River. •Studies of winter ecology of Canada geese including age, sex, breeding status, time of arrival related to feeding sites; studies included Rhode River and Davidsonville, Md. area; some bird collecting done on Western shore.
•Waste Placement, Sediment Transport	•Study of the role of stream-side forests in trapping nutrients from adjacent farmland before reaching stream channels. •Study of three types of forest zones (unaltered, control hydrology, control forest). 1. unaltered three control areas; 2. one site with hydrology controlled; 3. one site with hydrology and vegetation controlled

Table II-3 (con't)

Estuarine Sanctuary Related Research, Past and Current, at the Chesapeake Bay Center for Environmental Studies

MARYLAND ESTUARINE SANCTUARY PROGRAM RESEARCH TOPIC	CBCES RESEARCH ACTIVITIES/STUDIES
•Waste Placement, Sediment Transport	•Statistical model of small watersheds and determining effects of land use on runoff quantity and quality. Addresses conditions of even rain distribution (no localized storms). •Intertidal zone modeling to define O_2 levels in upper and lower Muddy Creek. •Tidal exchange modeling to provide statistical analyses of salinity and mass exchange rates for conservative materials between segments of creeks. Extends to Fox Point.
•Monitoring, Fundamental Research *Water Quality	•Water quality monitoring records since 1971 includes temperature, conductivity, pH, solar radiation, dissolved oxygen wind velocity, tidal stage (max./min. daily data worked up). •Switch to digital data in 1980; including temperature, conductivity, pH, dissolved oxygen.
*Upland Forest Ecology	•Studies of vegetation and relative abundance of bird species in different configurations of forest patches at some 270 sites in six Md. counties, including sampling at Rhode River Site. •Broad studies of insect communities in leaf litter and shrub growth in forest representative of successional stages.
*Upland Plant Ecology	•Long-term studies of plant populations including phenodynamics of two forests, monitoring tree gaps, and maintaining a census of vegetation in forests communities

Table II-3 (con't)

Estuarine Sanctuary Related Research, Past and Current, at the Chesapeake Bay Center for Environmental Studies

MARYLAND ESTUARINE SANCTUARY PROGRAM RESEARCH TOPIC	CBCES RESEARCH ACTIVITIES/STUDIES
*Meterology	•Studies of chemistry of precipitation including displacement of nutrients by acid ions and determination of effects on vegetation; studies of nutrient loading on aquatic conditions, including identification of nitrate sources to the estuary. •Analysis of seasonal and annual variations in precipitation. Contrast effects with changes in watershed land use.
*Aquatic Biology, Benthic	•Analysis many parameters of benthic ecology of invertabrates including impact of predation on populations, seasonal variability, and effects on larvae and juvenile recruitment. Three year record of data.

Note: A detailed description of resources studies at the site and the reasons for future associated research opportunities is described in a research proposal to the National Science Foundation by the Chesapeake Research Consortium, Inc., Feb., 1980. The proposal also describes a series of hypothesis for further testing at CBCES. (See Appendix C).

examined. Investigations into the effects of the educational setting on learning have yielded some fruitful results. The relative novelty of a setting, for instance, can dramatically affect both learning and behavior of children on a field trip. In addition, the use of nonverbal behavior as a tool for unobtrusively evaluating learning in museum or nature center settings is being explored. Family learning is an area in which CBCES is attempting to understand the role of parents in facilitating their children's acquisition of science concepts.

A series of environmental psychology studies have been completed documenting the influence of evolutionary forces in shaping present-day human landscape preferences. Additional work includes exploring cognitive mapping and way-finding in natural environments.

b. /Materials Development/

Closely related to the above research efforts are projects to improve the effectiveness of science education outside of the formal school setting. The Smithsonian Family Learning Project is designed to allow families to explore the ecology of their homes, and the science integral to their everyday lives. The Project appears to appeal to that sector of the public eager to find ways of aiding the education of their children in addition to school and educational television. A similar project aimed at early adolescents in out-of-school learning situations has recently begun. Other educational materials development projects have included a parent and preschooler package and an estuarine ecology package for 10-13 year olds.

c. /Public Programs/

Historically, the Center has conducted few public education programs except to the extent that they supported research or materials development efforts. For example, CBCES has conducted a number of parent preschooler classes, family workshops, and after school science clubs; all of these have aided material development efforts. There are also two longstanding programs: the summer Ecology Program for youths; and the Teacher-led Field Trip Program for school groups. Both of these programs have a long and successful record of public service.

Table II-4

Estuarine Sanctuary Related Education Activities, Past and Current, the Chesapeake Bay Center for Environmental Studies

CATEGORY	EDUCATION ACTIVITY
•Field trip research	•Study of the effects of specific types of pre-trip teaching materials on learning from a field trip to the National Zoo. •Test pedagogical efficacy of field trips through comparison of effectiveness of classroom learning vs. learning on a field trip.
•Role of the family in science education	•Investigations of parent-child interactions with regard to science-related topics. 1. Determine what aspects of family interactions children and adults view as important to the success of their exchanges. 2. Observational studies in learning situations.
•Mechanisms of cultural transmission	•Investigations of behavioral interactions between fathers and children while fishing on Maryland's Eastern Shore.
•Museum visitors research	•Investigation of how visitors to science museums allocate their time and how this affects learning
•Environmental influences on human behavior	•Cross-cultural studies in India and Nigeria of human preferences for various natural landscapes.
•Smithsonian Family Learning Project	•Development and testing of family activity packets designed to allow families to explore the science integral to their everyday lives.

Table II-3 (con't)

Estuarine Sanctuary Related Education Activities, Past and Current, the Chesapeake Bay Center for Environmental Studies

CATEGORY	EDUCATION ACTIVITY
•Science Activities for Informal Learning	•Development of science materials for early adolescents in out-of-school contexts.
•Teacher-led activities	•Programs for elementary school groups concerning ecological features and sampling techniques in estuaries and terrestrial areas.
•Public programs	•Public tours of CBCES, response to organizational requests.

C. SANCTUARY MANAGEMENT

1. Strategy

The objective of the Rhode River Estuarine Sanctuary management plan is to provide policy and guidelines for assuring long-term protection for the site from developmental disturbances. Primary emphasis is use for scientific and educational purposes. Other existing compatible uses will continue, subject only to existing state laws and Program objectives for research and education established by the State of Maryland and the Smithsonian Institution.

Site management on a day-to-day basis follows the long-term CBCES objective of maintaining a diversity of land use characteristic of the Mid-Atlantic coastal plain. Altogether, land use as practiced by the Smithsonian Institution at CBCES and by adjacent property owners, and water quality management for the Rhode River under State programs are compatible with the goals of the Estuarine Sanctuary Program.

Whereas Smithsonian Institution and State management responsibilities remain unaltered, administratively there is a shared cooperative approach to decisions made regarding Sanctuary activities at the site. This arrangement allows incorporation of Sanctuary goals, research and educational plans, and funding implications into proposed actions either organization believes is significant to an area of responsibility held or shared by the other. The site is therefore managed with the best creative ideas achievable by collaboration using the compatible goals of the Department of Natural Resources and the Smithsonian Institution.

This management plan is viewed as an action document by the Sanctuary and Site Managers and advisory committees to guide them in planning, and in other activities necessary for achieving Sanctuary goals.

2. Administration

a. /Sanctuary Manager/

The operation of Sanctuary Program activities at CBCES is conducted jointly by the permanent site manager and staff, and the Sanctuary Manager. The Sanctuary Manager is the main coordinator of site activities with the overall Program plan. His management priorities reflect the Maryland Coastal Zone Management Program. His responsibilities include:

- Preparing required budgets, reports, handling public relation activities, and maintaining necessary support information for the Site Manager and staff;
- Hiring and, if necessary, training staff to carry out specific administrative duties;
- Assuring site research and education programs are coordinated with other relevant Bay programs and plans;
- Working with members of the Site Advisory Committee on local issues and other matters which affect the relationship of the Sanctuary Program in the community; and
- Representing the Rhode River site and overall Estuarine Sanctuary Program in public on behalf of the State regarding issues, questions, and projects that affect the Sanctuary.

b. /Site Manager/

The CBCES Director, as Site Manager, provides continuous site leadership for Sanctuary activities. He is responsible for integrating CBCES's administrative and planning functions with Sanctuary research and educational program development. The CBCES staff handles the day-to-day of research and education programs. This includes field & field supervision work; site reports; contract management; and annual planning and assessment of the site's research and education projects.

c. /Site Advisory Committee/

The Rhode River Site Advisory Committee (SAC) is the public forum through which the agencies managing the site participate with local citizens to:

- Evaluate whether local land or water uses threaten the environmental quality of the Sanctuary site;
- Determine the nature of local problems arising due to the Sanctuary's educational or research programs;
- Make recommendations for research and educational projects which are of value to the local community;
- Attempt to resolve, if appropriate, user conflicts; and,
- Review the progress of the site plan.

The SAC is involved in overall Program matters through their representative on the Estuarine Sanctuary Management Committee.*

It is acknowledged by all parties that regular meetings of the SAC are extremely beneficial to maintaining Program focus and timely handling of administrative matters which require the attention of all three groups. The SAC chairman, Sanctuary Manager and CBCES Director are jointly responsible for setting agendas and assuring follow-up on administrative actions. The SAC has up to sixty days of review time before taking a position on Program policy or other detailed actions requiring consultation with their constitutents.

3. Policies and Guidelines

The basic responsibilities for site management include:

- Development and operation of an annual site plan, including a budget sustained by legal arrangements, key reports, etc.;
- Acquisition of funds to support desired research and educational

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*See Appendix A for listing of advisory committee members.

activities at the Sanctuary and participating, when helpful, in the consideration of plans or proposals of other programs which help achieve Sanctuary objectives; and

•Action upon consistence or compatibility issues arising from any of the above with current or proposed uses at the site.

a. /Site Plan/

Sanctuary Program activities are expected to place some additional, though undetermined, demand on CBCES facilities and site natural resources. In order to balance protection of site resources with research and education activities, an annual site plan is developed.

CBCES activities have clearly defined objectives and a plan for assessing accomplishments of those objectives. Annual Sanctuary objectives and plans are developed cooperatively by the CBCES research and education departments and the Sanctuary Manager. The site plan is intended to assure that anticipation of issues, planning time, and decision options are undertaken in the best interests of the Sanctuary Program and CBCES. In the event that CBCES programs change their goals or direction, some of the efforts of Sanctuary activities may be affected. Any changes are to be consistent with the overall Rhode River Estuarine Sanctuary goals.

Although the form and content of the plan is the responsibility of the Site and Sanctuary Managers, the planning strategy for the first year should address:

•Acceptable limits of use to existing facilities by Sanctuary involved personnel and visitors, including research, education and administrative buildings, field sites, and equipment;

- Conversions of facility use attributable to planned additional facilities, especially the educational complex;
- Control of visitor access under present and future site conditions, in particular, construction of the educational complex;
- The impact of the relocated access road on the site, including the parking arrangement necessary to accommodate both a new road and an education complex;
- CBCES and DNR staff roles and commitments to Program areas and projects;
- Anticipated issue areas; for example, potentially incompatible activities; Sanctuary activities of concern to the surrounding community; issue-areas of high priority for research and education lacking funding;
- Monitoring of plan implementation;
- Key site locations requiring special management attention; i.e., archaeological sites;
- Coordination activities with other educators and researchers; and
- Research and education priorities and methods for implementing them.

The site plan is a public record of the shared Program responsibilities between CBCES and DNR. It describes how they intend to operate given their funding and staff levels for that year. It also includes commitments from other site users as appropriate.

The site plan will be consistent with the CBCES master plan (scheduled for completion in 1983) and with the Maryland Coastal Zone Management Program.

b. /Site Plan Budget/

The operating budget for administering the Rhode River Sanctuary is derived from CBCES, federal and state funds. There is an annual NOAA Operation Grants to the Tidewater Administration, matched in-kind by the State. There are also CBCES grants and contracts for their annual research and education programs.

Of the yearly $50,000 Operation Grant to the State, one-half is used to pay the salary of the Sanctuary Manager and one-quarter is used to support priority work efforts proposed by the CBCES staff which help fulfill Program objectives that would otherwise go unfunded.

The CBCES budget is grant oriented. About 85% of past and current research is grant funded; 40-50% of that comes from the Smithsonian's Environmental Sciences Program. Other grants and contracts come from government agencies, etc.

1) (Project Funding Process)

For Sanctuary proposals originating within the Smithsonian track, the CBCES staff, the Sanctuary Manager, Tidewater Administration staff and, if appropriate, Program advisory committees provide a consistency review. They also consider prospects for funding, comparative possibilities at other sites, and otherwise become involved in serving worthy projects.

For research or education initiatives from outside the Smithsonian system, the Sanctuary Manager provides proposals to the Site Manager to start the CBCES review process. Either the Site Advisory Committee or the Estuarine Sanctuary Management Committee may serve as a forum to work out problems associated with proposals.

2) (Documentation)

The Sanctuary Manager and the CBCES Director's Office prepare all legal documents and supporting paperwork necessary for site plan implementation. The Memorandum of Understanding between the Department of Natural Resources and the Smithsonian is the basic agreement on all major points of responsibility needed to set the Program into action at the site. It also serves as the framework for considering future administrative responsibilities for either party under their respective mandates on significant Program points.

c. /Research Planning/

The research history at Rhode River enriches the opportunities at the Sanctuary for future work that can use its existing estuarine data. The resource base has already been described for its comparative values in research projects. The listing of topics in Table II-5 suggests types of research that can reasonably be expected to be undertaken at the site for Sanctuary purposes. They include:

- Use of existing Rhode River research to provide comparison with sites elsewhere in the Bay;
- Updating and integrating existing inventory and data to complement comparable research efforts elsewhere in the Bay;
- Research which can meet additional management needs for the Sanctuary; and
- Investigative research of ecological systems that will add to the understanding of on-site processes.

Table II-5

SUGGESTED RESEARCH OPPORTUNITIES AT
RHODE RIVER ESTUARINE SANCTUARY SITE

Topic	Research Activity	Rationale
•AQUATIC ECOLOGY	•Sampling of Zooplankton in Rhode River estuary.	Major gap in existing biological studies; would complement existing data.
	•Continue survey of submerged aquatics. Identify causes for reduction in abundance through continuity of surveys identified earlier.	Opportunities exist for comparison with Monie Bay where incidence of submerged aquatic vegetation is high. Identification of relationship to decline in other aquatic life.
	•Identify links with decline of oyster beds and available submerged aquatics.	Evaluate practicality of reinstating the oyster beds.
	•Continue survey of Juvenile Fish Population. Identify cause of declines in abundance of selected sport and commercial fish.	Arrest decline in fisheries.
•WATER QUALITY	•Continuation of Water Quality monitoring at USGS sampling station next year.	Funding from USGS will run out next year. Provides water quality data in estuary.
	•Contrast conservative and non-conservative material exchange between segments of creeks.	Additional understanding of nutrients and sedimentation effects on biological conditions.

Table II-5 (con't)

SUGGESTED RESEARCH OPPORTUNITIES AT
RHODE RIVER ESTUARINE SANCTUARY SITE

Topic	Research Activity	Rationale
•WATERFOWL	•Migration studies of Buffle head duck including homing instincts and survival.	Building upon existing records.
	•Dying and banding of canvas back duck to measure sex ratios, weight fluctuations etc.	Building upon existing records.
•UPLAND ECOLOGY BIRD/INSECT	•Study of relative abundance of bird species in different forest successional stages.	
•EROSION	•Identify causes of erosion at site peninsulas. Build upon ongoing studies elsewhere.	Develop management techniques to control erosion.
•AIRSHED EFFECTS	•Continue current monitoring rainfall ph.	Determine impact of acid rain on fish populations in tributaries to the Bay.
	•Determine impact of high acidity rainfall on biota in tributary streams.	

d. /Education Planning/

The Sanctuary education program works out of the education department at CBCES. The unique capabilities of CBCES provide the means by which day-to-day Sanctuary education programs may be conducted either on site property or off the site (e.g., within local communities or at other estuarine sites). The education program is to be comprehensive; recommended activities and materials include:

- Replicable, generalizable programs about estuarine ecosystems that could be used in various areas nationwide (e.g., written education materials, teacher training materials, etc.). This activity, while not site specific, can greatly enhance the overall education objectives of the Sanctuary Program and be of use to sanctuaries throughout the United States;
- Programs that emphasize the role the Rhode River plays in the entire estuarine system of the Chesapeake Bay (e.g., slide shows, trips, exhibits); and
- Site-specific programs that focus on the immediate features of the Rhode River site (e.g., field trips, tours).

1) The education program emphasizes quality of programs rather than quantity of people served, providing the best possible programming for the most people possible. Needs assessments and cooperative planning are part of education program development to minimize duplication of other estuarine education efforts at other Estuarine Sanctuary sites and elsewhere in the Chesapeake Bay area. Other educators and educational institutions (e.g., National Aquarium, Chesapeake Bay Foundation, Anne Arundel Public Schools, etc.) are encouraged to use the Sanctuary site as an educational resource.

2) Educational programs at the Sanctuary are designed to reach a diversity of audiences which might include: schools and school groups; out-of-school groups such as scout groups or clubs; general public groups including families; and special groups such as senior citizens, gifted students, handicapped persons, preschoolers, or visiting groups with particular interests. Priorities of the education program are in large part determined by the source and availability of funds. However, basic programming is likely to include some of the following:

- On-site field trips for school groups;
- Public tours;
- Curriculum development in estuarine science;
- Teacher workshops;
- Lecture or film series;
- Programs for special audiences: gifted, handicapped, senior citizens, families, preschoolers, etc.;
- publication of informative brochures; and
- Development of estuarine-relevant home computer software.

3) The education program is sustained through a combination of funding, staff and special educational facilities.

- A Rhode River Estuarine Sanctuary fund will be established to help insure long-term support for educational efforts at the site. Monies generated through grants, donations, membership dues, programs and publications will be included in this fund. The fund will be used exclusively for the development and implementation of education programs.

•CBCES and DNR will employ an education director/coordinator for the education component of the Estuarine Sanctuary. This person will plan and implement appropriate activities within the Sanctuary, and inform the Rhode River Site Advisory Committee of ongoing or proposed educational activities. The role of the education coordinator is supplemented by the Coastal Zone Management Program public participation coordinator for his/her expertise in fulfilling DNR's share of the educational program, particularly at the educational complex. This applies to both planning and promoting specific activities.

•Specific education areas will be designated within the Sanctuary. These will include the proposed education complex, current education areas, trails, roads, boardwalk and buildings. The purpose of these areas is to preserve the greater area of the Sanctuary by limiting public access to these designated sections. They provide areas where visitors can have direct exposure to the estuary, yet minimize the risks of health/safety hazards within the Sanctuary.

The building to be completed within the educational complex will provide facilities for classes, seminars, temporary exhibits, interpretive materials, offices, and storage. In general, the building will serve as a focal point for estuarine education at the Sanctuary. The building provides a site where estuarine oriented exhibitions, materials, computer software, etc. can be developed and tested prior to broader dissemination. The building will provide direct access (e.g., dock facility) to the estuary.

D. SITE MANAGEMENT PLAN POLICIES AND GUIDELINES - CONSISTENCY DETERMINATIONS

1. Strategy

Consistency determinations under the Sanctuary Program are the joint responsibility of the Site and Sanctuary Managers, with advisory committee assistance as appropriate where current or proposed activities might appear in conflict with this site plan. As consistency issues arise from time-to-time, it is the policy of this Program to use open meetings and other communications between members of the Program and the proposers, and the affected public if so determined, to reach an outcome. This is intended to assure all significant viewpoints are heard, a productive exchange is promoted and that the outcome reflects consideration of the best options by a decision method all understand.

The Estuarine Sanctuary Program policies and guidelines for the multi-site system (Chapter I) and the Rhode River site, in particular, must be addressed and results recorded in any decision of significance affecting Program administration. When necessary, the dispute settlement provisions of the interagency Memorandum of Understanding are used to assure that a significant issue is not allowed to go unresolved indefinitely. Areas where consistency issues may be expected are: public access to the site; resource preservation and site integrity from human activities; and capital improvements.

a. /Public Access/

The CBCES policy toward visitors at the Rhode River site is compatible with the Sanctuary Program. The Center's benign approach to visitor access to the area is possible due to its remote location and a respected, consistent policy over the years for scheduling visitations. Present access to and use of the area either by out-of-town visitors or by adjacent landowners, is not a problem.

Access by the general public to the Sanctuary is for educational purposes. Entry is temporarily by way of Contee Wharf Road. Researchers, education groups and Sanctuary guests will continue to have access both by road, and by boats from Rhode River and Muddy Creek.

It is policy under the Sanctuary site plan not to encourage additional numbers of visitors to the area beyond the 1981 level until the Sanctuary education complex project is completed. At that time, that policy will be reviewed to the satisfaction of the Site Manager, Sanctuary Manager and Advisory Committees. The following guidelines will be used for addressing public access issues:

•Keep visitation impacts within tolerable levels, controlling the location and amount of human activity on the site by:

*Providing guided access, e.g., tours, in designated areas under the Sanctuary education program; All public access references, especially signs, will show only one access point for visitors, through Contee Wharf Road. Signs, if any, will provide direction to that access point. Public relations will emphasize site use around a scheduled calendar;

Using the present CBCES permit system to coordinate research activities with visitor use: and

*Directing spontaneous visitation to the front desk of the Center office. They handle drop-in visitors by providing information, handling limited numbers of tours, and arranging future visits.

•Maintain close ties with adjacent property owners, waterskiers, etc., through the Site Advisory Committee, using their ideas and support in assuring that proper conservation practices continue at the site boundaries; and

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*See Appendix D

•Assure sanitation and litter control are in place at all major public visitation points.

b. /Site Preservation/

The overriding intent of the Sanctuary Site Plan is to provide guidelines for the permanent protection of the Muddy Creek estuary and watershed. Article III of the Memorandum of Understanding between the Maryland Department of Natural Resources and the Smithsonian Institution (See Appendix E) places emphasis on its long-term use as a preserve for environmental research and education. This policy is elaborated below for site preservation purposes.

1) (Sanctuary Boundary)

The Sanctuary boundary remains as depicted in the FEIS with the downstream Muddy Creek water boundary drawn along a point from Fox Point to the western shore of Boathouse Creek. This shoreline boundary does not inhibit Estuarine Sanctuary Program activities or threaten preservation of the shoreline under present non-permitted activities. The question of Rhode River water quality, a major concern of local residents, will be an important consideration in the Program's research plan. If, in the future, findings indicate that acceptable water quality is not maintained, CBCES, the Sanctuary Manager, and the Site Advisory Committee can reconsider boundary implications in addressing this problem.

There is no intention of acquiring additional land for the Program beyond the present Sanctuary boundary. CBCES policy is to maintain good contact with adjacent property owners and work with them to assure that the Muddy Creek watershed is not degraded.

2) (Land and Water Uses)

All activities permitted or prohibited at CBCES as described in the FEIS are included in the site plan. The Site Advisory Committee and the Estuarine Sanctuary Management Committee periodically review DNR and CBCES

monitoring of activities at the Sanctuary site. Use of the site is for scientific and educational purposes related to estuarine studies and all such non-destructive work is encouraged. Existing activities such as boating, canoeing, commercial and sport fishing, waterskiing and wildlife photography in the State-owned waters east of the Sanctuary which are compatible uses, will continue subject to State law and this site plan. Hunting and trapping are not allowed by the Smithsonian Institution on CBCES property.

Sanctuary Program activities are not expected to have significant impact on the site or on those activities presently enjoyed on the Rhode River.* Those uses are specifically protected under Article I of the MOU. All pertinent local, State and Federal plans or policies, as stated in the FEIS, remain in force.

3) (Capital Improvements)

Establishment of the Sanctuary may result in some disruption to the environment through construction of a parking area, marsh boardwalk, education complex, improvements to an existing road, clearing of nature trails and related activities. All capital improvements are intended to help carry out the purposes of the Estuarine Sanctuary Program with a very minimum of adverse impacts on site resources. An environmental assessment and the appropriate, approved permits will be required before money is granted for any construction; any affected local property owners are to be notified.

A detailed policy for the use and protection of the 15 acre Sanctuary education complex will be established. One objective is to direct visitor use to the complex and away from more fragile site areas. A goal is to keep activities outside the complex bounds at no higher than current levels of use (e.g., nature trails and interpretative tours) unless review

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*See pages 41-43 and 52-55 of the FEIS

of such uses indicates that only acceptable impacts would result from this greater use.

The building is intended primarily for public education purposes and will be used jointly by the Smithsonian Institution and the State of Maryland. The agreement calls for the Smithsonian Institution to grant at no cost to the State a leasehold interest in 15 acres of its property for an initial period of 50 years, renewable at the State's option for successive periods of 10 years or less. It will serve as the building site and adjacent parking area.

The education building and any related structures to facilitate visitor use, such as, for example, marsh boardwalks and boat launching ramps, are to be completed by September 24, 1984. The design, requirements, and construction time schedule for these facilities are to be governed by the "Procedures for Construction of the Rhode River Sanctuary Education Complex." This will be prepared within three months following execution of the Memorandum of Understanding.

The education complex will occupy a tract which contains three known prehistoric archeological sites. Two of these sites fall entirely within the boundaries of the tract. As part of the Maryland Board of Public Works Policy concerning architectural and archeological sites on newly acquired State property, the Tidewater Administration will conduct an archeological survey of the property to document the extent and nature of the known sites. They will also develop recommendations for the preservation and interpretation of those sites determined by the Maryland Historical Trust to be significant. The Trust has prepared proposed work program (see Appendix L for summary and map) to provide guidance to project developers during all stages of the project. Implementation of the program

will meet the evaluation requirements of the Board of Public Works Policy. It will also aid in the development of project interpretive plan incorporating the results of the archeological work into the educational program at the Sanctuary. The projected cost of the project, if conducted by the Trust, is $16,950.00.

Impacts on Sanctuary resources due to visitor activity are to be minimized by using existing roads and trails for visitor access. However, in order to allow visitors to closely examine marsh vegetation zones, a boardwalk will be constructed to prevent disturbances to plants. The CBCES Office of Design has a master plan in progress for its road system, including the proposed new access road from Md. Rt. 468 via an abandoned farm road. This new access point will replace Contee Wharf Road for entry to the Sanctuary education complex. The Department of Natural Resources and the Site Advisory Committee will review this plan as it addresses: right-of-way agreements and easements for construction, especially for access to the complex; control of visitors at the site by way of parking areas and general traffic control; and adverse impacts referred to in the FEIS, page 53.

E. CONCLUSIONS

1. Site Location

*The present CBCES Site boundaries and land use management approach are satisfactory for Estuarine Sanctuary purposes. Included are 2,275 total acres, with 90 acres of State waters.

2. Site Organization/Facilities

*The CBCES director, as Site Manager, and CBCES staff, constitute the permanent Sanctuary staff. Their Education Program warrants additional personnel to coordinate Sanctuary Program education activities.

*The Rhode River Site Advisory Committee is a new and important link for the Smithsonian Institution, DNR and the surrounding communities. Local issues which arose during designation can now be addressed through this group.

*Present CBCES facilities for Estuarine Sanctuary research and education proposed activities are good although, for educational purposes, separate and expanded facilities would enable that potential to come into being.

*DNR and the Smithsonian Institution have a formal agreement which provides for the operation of the site, their respective responsibilities, Program contingencies, and for the long-term lease of 15 acres adjacent to the estuary for an educational complex.

3. Site Planning/Research and Education Activities

*The Sanctuary site plan, as presently developed, presents no conflict with CBCES's master planning effort, local plans, or the State's Coastal Zone Management Program.

*CBCES's extensive 15-year research history offers baseline work in watershed studies, estuarine ecology and upland ecology useful to the further investigation of Western Shore tributaries.

*CBCES's education program, as with its research counterpart, is well established and prolific. The Sanctuary Program will tap its work in environmental learning methodologies, materials development, and in providing numerous learning experiences.

*Neither Sanctuary nor CBCES activities are considered to have significant adverse impacts on site resources. Careful work is required, however, at the educational complex location to properly determine the extent of archaeological artifacts there and how to assure their protection.

4. Public Access

*Visitor traffic to the site totals approximately 3,600 for 1981-2. This level is satisfactory until the education complex is built and the access policy is reviewed.

*A new access route to the site is proposed and should be constructed within the next several years.

*The education complex should minimize the impact of visitor traffic and educational activities on site resources, yet provide the public with worthwhile experiences at the estuary.

F. RECOMMENDATIONS

1. Site Preservation

*CBCES should continue to promote sound watershed management practices with its adjacent property owners, and encourage agreements (i.e., agricultural districts) which help assure compatibile land and water quality in the Muddy Creek watershed in particular.

*A satisfactory system for monitoring the water quality and user levels in other sensitive site areas should be in place, helpful to Sanctuary staff in determining enforcement problems, access needs and general site supervision requirements.

2. Site Management

*A portion of each year's Operation Grant from NOAA to DNR should continue to be passed through the Tidewater Admin. to CBCES for Sanctuary purposes.

*An education coordinator for the site should be hired from Operation Grant monies, matched by CBCES funds or in-kind services, for at least the first two years.

*The Site Advisory Committee should continue in its present form, meeting at least quarterly. They should be guided in their activities by a yearly site plan outline which they help prepare.

3. Site Activities/Planning

*Estuarine Sanctuary Program research and education priorities should be drafted immediately upon adoption of the site plan.

*The Rhode River Site Plan should reflect consideration of both Smithsonian Institution and DNR plans and budget realities. Other major institution programs should be approached to compare trends and needs for coordination purposes.

*The site education coordinator, Sanctuary Manager, Site Advisory Committee and others should participate in designing the educational complex to assure a functional building results from the users' perspective. An Estuarine Sanctuary Program position on the future use of CBCES office space subsequently vacated could also be provided by this group.

*As delay in signing the DNR-Smithsonian Institution MOU has narrowed the time alloted for use of acquisition funds from NOAA to construct the education complex, the principal parties should develop and adopt a schedule which will assure the completion of this project without jeopordizing those funds.

*The archaeological assessment to be done at the education complex site should be carried out such that the project enhances the Sanctuary's overall education and research programs.

4. Public Access

*Public use of the site should remain at approximately the current level of 3,500 visitors. The Smithsonian Institution, DNR, and the Site Advisory Committee should review the capacity of the site for visitors when the education complex, new parking facilities and new access road are completed.

(cut along this line for mailing purposes)

G. REVIEWER'S WORKSHEET FOR THE CHESAPEAKE BAY ESTUARINE SANCTUARY PROGRAM IN MARYLAND, RHODE RIVER SITE PLAN (DRAFT)

1. Site Selection Background:

Comments

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2. Site Use and Existing Plans:

Comments

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3. Sanctuary Management:

Comments

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_____

_____

4. Consistency Determinations:

Comments

_____

_____

_____

5. Conclusions:

Comments

_____

_____

_____

6. Recommendations:

Comments

_____

_____

_____

7. Overall/Other:

Comments

_____

_____

_____

8. Level of Plan Support: (May I contact you about problems you raise?)

Yes ☐ No ☐

I/We support the Plan in its present form.

I/We support the Plan with modifications:

_____

_____

_____

I/We do not presently support the Plan because of these problems:

_____

_____

_____

Name _____(affiliation)_____

Address _____

Telephone _____

PLEASE RETURN TO: Scott Brumburgh, Estuarine Sanctuary Manager
Tidewater Administration
Md. Dept. of Nat. Res., Tawes Bldg., C-2
Annapolis, MD 21401 tel: 301/269-3382

DEADLINE FOR COMMENTS: ~~March 31~~ MAY 30, 1983

CHESAPEAKE BAY ESTUARINE SANCTUARY PROGRAM IN MARYLAND

MONIE BAY SITE MANAGEMENT PLAN

INTRODUCTION

The Monie Bay Sanctuary site, located within the Deal Island Wildlife Management Area (DIWMA), is a relatively undisturbed embayment on the Eastern Shore of the Chesapeake Bay. DIWMA was acquired by the Maryland Department of Natural Resources (DNR) for the conservation of recreational wildlife and fish. Sanctuary designation adds new research and education capabilities to the DIWMA and provides additional protection to site habitat. Activities under the Sanctuary Program should lead to improved technical information and public awareness of this estuarine system, valuable to management decisions which affect this region of the Bay. In addition, the site should, in conjunction with other estuarine study areas in the State, extend the relevance of information derived from Monie Bay to the whole of the Bay.

Significant background work went into the selection of Monie Bay by the State of Maryland and the United States Department of Commerce, NOAA, as a site in 1981. The document produced as a result of that effort, the Final Environmental Impact Statement: Chesapeake Bay Estuarine Sanctuary, (FEIS) is an integral counterpart to this report. Background information in the FEIS, including history and data on the site, is not repeated here.

A. BACKGROUND

1. Site Selection Overview

The Monie Bay Sanctuary site typifies the lower Maryland Bay in ecological terms, especially with regard to water circulation (the mixing rate of fresh and salt water), salinity and terrain- flat, with broad marshes. The site offers the features basic to a functional Bay sub-system. It provides the wetland types, surrounding physiographic features, land use and overall environment, which together constitute a watershed system. It also meets the management conditions essential to the acquisition, preservation and operation of a site under the Program. This includes maintaining a balance between current and potential human use disturbances, and the ability to keep the integrity of the ecological system intact at the boundaries.

This site was selected from among a number of candidate areas based on six ecological criteria.

Ecological Basis for Selection of
Monie Bay as an Estuarine Sanctuary Site

•Presence of a complete system

The Sanctuary includes the inner portion of the Monie Bay estuary beginning at a line drawn between Victors Creek and Marsh Gut. Extensive areas of Monie Creek wetlands and its limited upland forest, and lower portions of the Little Monie and Little Creek tributaries are also included. None of these creeks have their watersheds entirely within the site boundary. Acquisition of four additional parcels is expected to add protection to those watersheds.

•Minimal disturbance/compatible land use.

Even with hunting, trapping and fishing permitted at Deal Island by the MWA and state wildlife management activities occuring, the site remains relatively undisturbed. It is almost entirely surrounded by a buffer of upland forest. Agricultural uses, low density residential housing and some timber harvesting occurs beyond the boundary. None are considered incompatible with the Sanctuary.

•Suitability for research and education

Research at Deal Island indicates a diversity of flora and fauna. Marsh management issues such as mosquito control, ponding, and water level control suggest further opportunities for education and research. Contributions could be directed to the recreational wildlife management and pest control programs used in this region of Chesapeake Bay.

•Representativeness of a larger Bay area.

The site is representative of brackish marshes of the Eastern Shore, especially those of Southern Dorchester County and the rest of Somerset County, but excluding the fresher water marsh along major tributaries.

•Presence of endangered or threatened species

The rare Swamp sparrow has been sighted on the site. There are no known Bald eagle nests in the site although the area is frequented by them. Some Peregine falcon use of the area has been documented.

•Diversity of habitats

The Sanctuary contains most of the vegetation types typical of brackish high and low marshes. However, some of the vegetation that is dependent on least brackish conditions are present in limited areas. The wetlands are bordered by forest upland, and scattered stands of Loblolly pine exist. Selected areas show diversity of shrub and canopy. No saline or fresh marshes are present.

2. Site Boundaries

The land boundaries of the Sanctuary site are contained within the lands owned in public trust by the State of Maryland as the Deal Island Wildlife Management Area, managed by the Department of Natural Resources' Maryland Wildlife Administration (MWA). Upstream boundaries for this site coincide with DIWMA property lines and include Monie Creek to about Drawbridge Road; the northern side of Little Monie Creek to near Phillips Road; the western side of Little Creek down to Mongrel Neck and the mouth of Marsh Gut. The Sanctuary boundary stops at the mean high water mark, which is State-owned. The western boundary lies along a point from the mouth of Marsh Gut to the mouth of Victors Creek on Monie Bay.

Four parcels of land which would add significant protection to the Little Monie and Little Creek watersheds may be acquired by the State from voluntary, willing sellers.

Recommended Land Acquisition & Composition of Real Property Monie Bay Estuarine Sanctuary Site

Recommended Acquisitions

#1. Marsh Gut watershed;

#2. & #3. The upstream, western side of Little Creek to Deal Island Road;

and

#4. Marsh between Little Monie and Little Creeks, near their confluence.

Composition of Real Property

Owner	Size in Acres
State of Maryland (Deal Island Wildlife Management Area)	2,249
(water only)	756
Proposed Acquisition	
Pocomoke Realty (Marsh Gut)	137*
Ms. Eva Shores (Little Creek)	64*
Mr. Brian A. McDonald (Little Creek)	27*
Glatfelter Pulp Wood Co. (Little Monie Creek - Little Creek)	243*
Total	3,476 acres

*Estimated acreage, pending completion of land surveys by Maryland Department of Natural Resources.

3. Affected Environment

An assessment of the site's natural* and human environment, current conditions, impacts associated with having a Sanctuary Program, and compatability with other plans in place is presented in the FEIS on pages 43-50 and 55-59.

4. Location of Significant Site Land and Water Characteristics

The Sanctuary site presently includes about 3,000 acres of estuary, creeks, wetlands and uplands of the Monie Bay ecosystem. Figure III-A locates the boundaries and significant resources within and adjacent to the Sanctuary.

The major natural land and water features of the site, as well as important uses to which the area is put by man, are described under wetlands, uplands, estuary and surrounding land use.

a. /Wetlands/

The coastal wetlands of Maryland are broadly classified as shrub swamps, swamp forests, fresh marshes, brackish high marshes, brackish low marshes, saline high marshes, saline low marshes, open water, sandbars, and submerged aquatic vegetation.

The site contains brackish high and low marshes. The subcategories listed in Table III-1 represent the dominant wetland species found at the site.

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*A list of bird and mammal species found at DIWMA is provided in Appendix F.

MONIE BAY REGIONAL MAP

FIGURE III-A

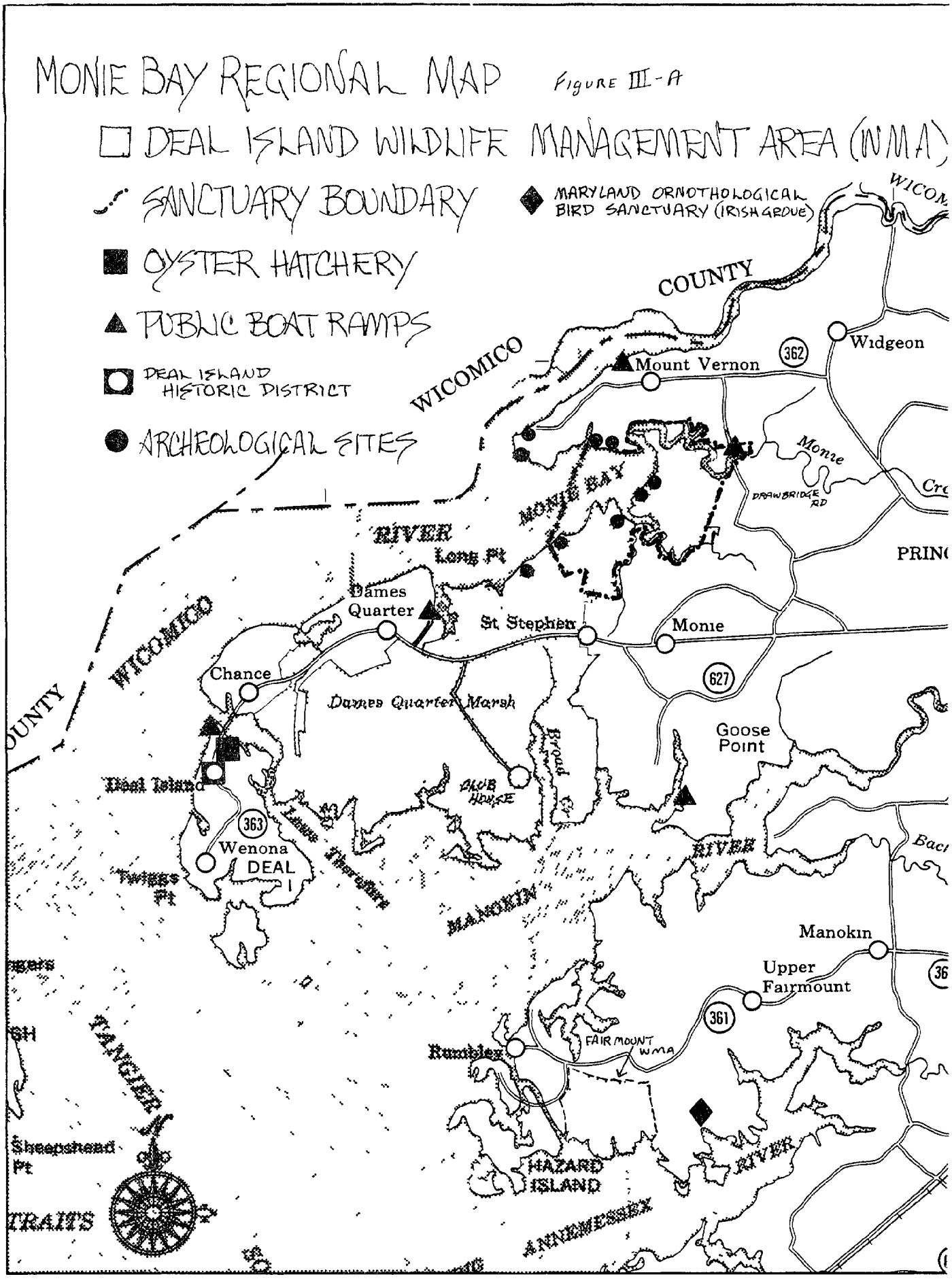

Table III-1
SELECTED VEGETATIVE TYPES PRESENT AT MONIE BAY SANCTUARY SITE

Brackish High Marshes	
Meadow cordgrass/Spikegrass	Spartina patens/Distichlis spicata
Marshelder/Groundselbush	Iva frutescens/Baccharis halimifolia
Needlerush	Juncus roemerianus
Switchgrass	Panicum virgatum
Threesquare	Scirpus spp.
Big cordgrass	Spartina cynosuroides
Brackish Low Marshes	
Smooth cordgrass	Spartina alterniflora

Source: The Coastal Wetlands of Maryland, 1982, Table 44, p. 117.

Many of the subcategories are present in monotypic communities, such as Meadow cordgrass, Threesquare and Big cordgrass. Typical combinations of subcategories are present (Meadow cordgrass and Marshelder); some are clonal (Needlerush) and include pans. Switchgrass is typical of the least brackish waters. These exists a wide variety of blends or combinations of brackish high marsh categories with no type being dominant.

Table III-2 taken from the Deal Island Wildlife Management Area Plan, lists the vegetation present in that area. Compartment III (Wetland) comprises most of these found in the Sanctuary site, with the remainder in Compartment I (Upland).

b. /Upland/

Upland vegetation within the Sanctuary consists principally of Loblolly pine. Certain areas where Loblolly pine dominates include swamp forest, because a marsh understory is present. Few small Loblolly pine occur in forests on the site, possibly due to saltwater intrusion.

Table III-2

REPRESENTATIVE VEGETATION AT DEAL ISLAND WILDLIFE MANAGEMENT AREA, 1977

	Species		Management Plan Compartment		
	Scientific name	Common name	(Upland) I	(Rookery) II	(Wetland) III
1.	Chara spp.	Muskgrass	X	X	
2.	Distichlis spicata	Saltgrass	X	X	
3.	Echinochloa frumentacea	Japanese millet	X	X	
4.	Iva frutescens	High-tide bush	X		X
5.	Juncus gerardi	Blackgrass	X	X	
6.	Juncus roemearianus	Needlerush	X	X	
7.	Juniperus virginiana	Red cedar	X		X
8.	Kosteletzkya virginica	Saltmarsh mallow	X	X	
9.	Liquidambar styraciflua	Sweetgum			X
10.	Nyssa sylvatica	Black gum			X
11.	Panicum virgatum	Panic grass or switchgrass	X		X
12.	Phragmites communis	Phragmites	X		X
13.	Pinus taeda	Loblolly pine		X	X
14.	Pluchea purpurascens	Saltmarsh fleabane	X		
15.	Potamogeton pectinatus	Sago pondweed	X		X
16.	Quercus spp.	Oak			X
17.	Ruppia maritima	Widmeongrass	X	X	X
18.	Scirpus robustus	Saltmarsh bulrush	X	X	
19.	Spartina alterniflora	Saltmarsh cordgrass	X		
20.	Spartina patens	Saltmeadow cordgrass	X	X	
21.	Typha spp.	Cattail	X		
22.	Zostera marina	Eelgrass	X		

Source: Deal Island Wildlife Management Plan, Appendix B, 1978.

Consequently, swamp forests are observed to be declining in the Sanctuary area.

Forest stands are dominated by Loblolly pine in the canopy and wax myrtle and greenbrier in the shrub layer.* Poison Ivy covers many of the trees, and grasses predominate in the herbaceous zone. The areas are wet, and some act as buffers between logged areas and marsh.

Vegetative cover at Deal island is illustrated by the results of five, one-tenth acre field samples taken in 1982 by the U.S. Fish & Wildlife Service, adjacent to the Sanctuary. Site results and coordinates are presented in Appendix G; the sampling sites are located in Figure III-B.

c. /Estuary/

Sport fishing is popular in Monie Bay during spring and fall. The principal commercial activities are crabbing and troutlining. Oysters and soft shell clams are found here, and eel is potted in the spring. This is not a major commercial fishery area as is the Wicomico River to the north.

Some white perch and yellow perch spawn in the guts in the spring. The Tidewater Administration operates a shell fish hatchery on Deal Island near the Sanctuary.

d. /Surrounding Land Use/

The Monie Creek and Little Monie Creek watersheds are largely undeveloped; they are mostly woodland, with some agricultural use. Those agricultural activities include crop and poultry production with their associated facilities. A small number of homes are situated along Md. Route 363 to the south of the site. This level of development presents no water quality problem for the Sanctuary.

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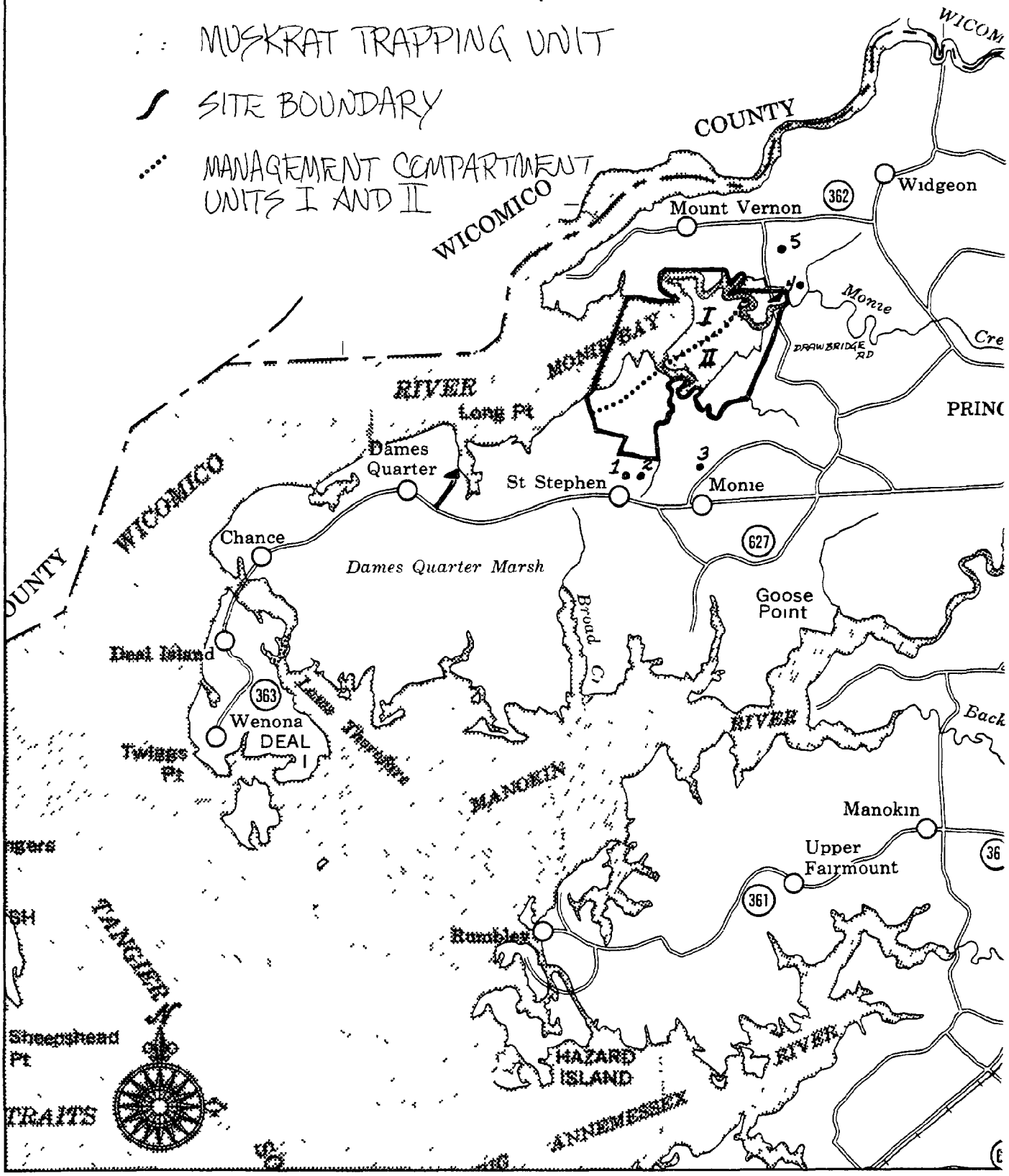
*Maryland Upland Natural Areas Study Printout, June, 1975, (Somerset County areas 2400 & 2600).

MONIE BAY ACTIVITIES MAP

FIGURE III-B

- ● VEGETATION SAMPLING SITES
- : : MUSKRAT TRAPPING UNIT
- ∫ SITE BOUNDARY
- ···· MANAGEMENT COMPARTMENT UNITS I AND II



In the Somerset County Comprehensive Land Use Plan, the Sanctuary site is identified as a wetland with high preservation value. County policy is that little or no development should take place in wetlands. Residential development might be permitted in certain instances, but only on large lots of five acres or more.

The entire Sanctuary is zoned Conservation. Some areas within a mile of the sanctuary to the East are zoned agriculture. (See Figure III-C).

MONIE BAY ESTUARINE SANCTUARY
ENVIRONMENTAL SYNOPSIS

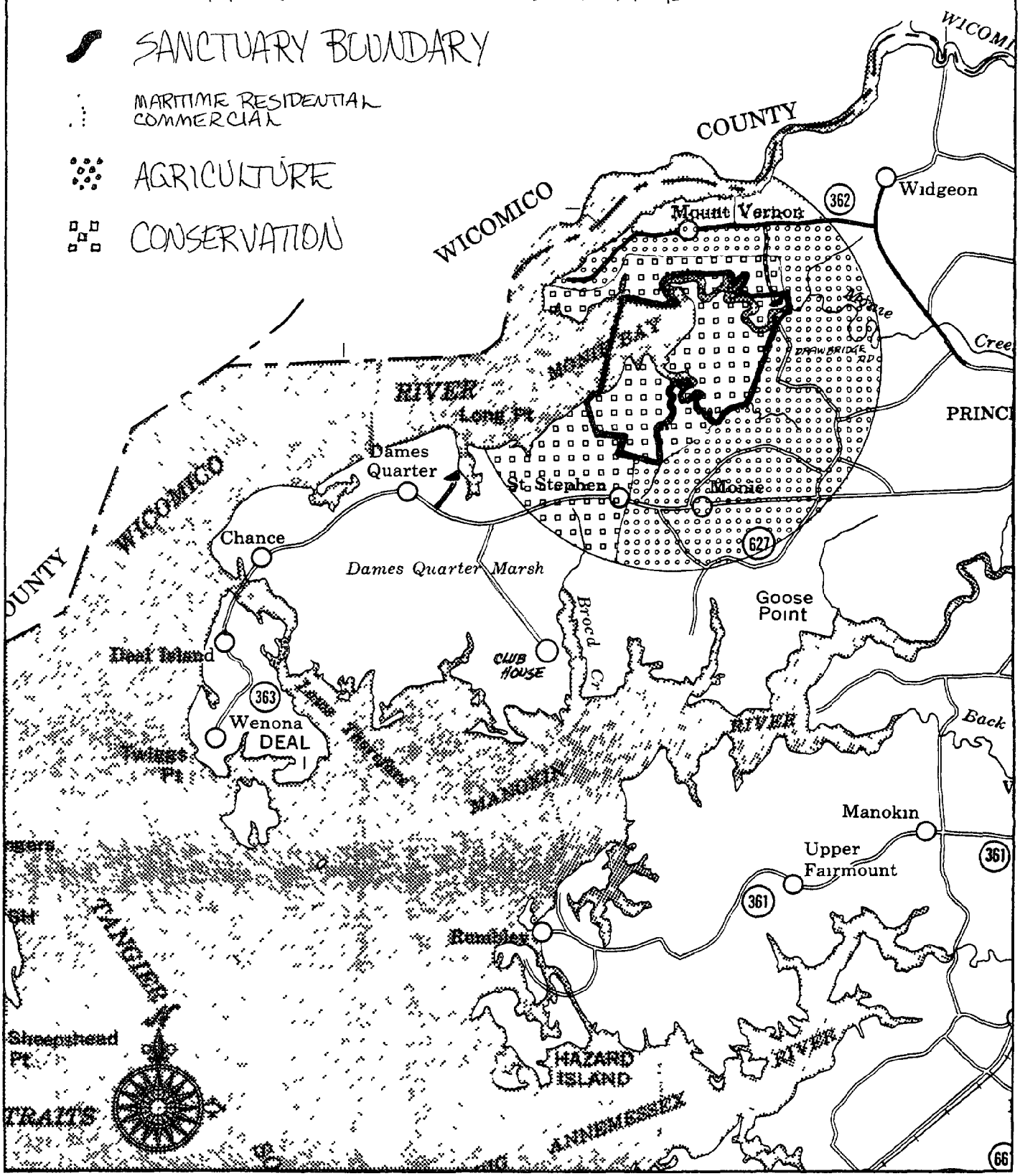
A NARROW ESTUARY bordered by small-grained, river-deposited sands mixed with clays and shell beds. Overlapped by marsh beds of more recent geologic time, extensively cut into bay flats and broad valley bottoms.

Climate - Humid with mild winters and hot summers; mean air temperature range 88°F in July, 28°F in February.

Hydrology - Monie Bay surface area - 1.2 square miles.
Monie Bay depth at mouth of Little Monie Creek - 2'; at Tangier Sound - 6'.
Salinity range - 12 ppt in Spring; 17 ppt in Autumn.
Water Temperature range - less than 1 degree Centigrade to 33 degrees Centigrade.
Tides - semi-diurnal; mean range of 1'; higher water levels in Spring and Summer.

MONIE BAY ACCESS & ZONING MAP

FIGURE III-C



B. SITE USE AND EXISTING PLANS

1. Present Site Facilities and Use Level

a. /Facilities/

Maryland Wildlife Administration facilities at DIWMA are not located on Sanctuary grounds (refer to Figure III-C). The site manager's home/office/part-time dormatory (formerly a hunting clubhouse) is located south of the site; the closest active boat ramp to the Sanctuary is located near Dame's Quarter. A boat ramp facility on the north side of Drawbridge Road in the Sanctuary Area is now in disrepair and will be replaced under the Sanctuary Program. There are no other facilities at the site to affect access to the Sanctuary or its management.

b. /Present Use Level/

No counts of user levels are available for the Sanctuary. Visitor use is generally described as low by the MWA. Most user days are associated with crabbing, fishing and both recreational and commercial hunting and trapping.

Trapping of muskrat is estimated to amount to 750 recreation user-days. Most hunting is in the wetlands with upland hunting contributing some 5-8% of the total recreational wildlife hunting user-days.

2. Past and Current Research Activities

Since the acquisition of land known as the Deal Island Wildlife Management Area began in 1948, the State has sought to actively enhance fish and wildlife habitat through land management practices. An important part of WMA management programs is data collection on species numbers, densities and reproduction rates, and other activities to determine the resource base and recreational demand and harvest results.

Research activities conducted by the Maryland Wildlife Administration at DIWMA and its other public holdings are guided by the Maryland Fish and Wildlife Comprehensive Plan for 1983-7 (draft). This is a general program of action composed of strategic and operational planning for all valued fish and wildlife species. Under the Plan, research contributes to:

- Assessing and seeking to lessen or eliminate adverse impacts to these resources from public and private projects;
- Using the land for hunting, at recreational levels, compatible with other land uses and within the carrying capacity of the land, and for scientific and educational purposes;
- Preventing certain species, i.e., rails and ducks, from being threatened or endangered; and
- Re-establishing other wildlife as viable species.

Past and current DIWMA research programs and projects provide the starting point for developing a Sanctuary research plan and research topics. Relatively little research information exists on the Sanctuary site itself, most activities having taken place in adjacent parts of the DIWMA. Table III-3 presents a list of past and current research correlated to the Sanctuary Program research categories identified in Chapter I.

The sources used in determining the list were:

* On-site research;
* Research on resources with similar conditions within the Chesapeake Bay;
* State or regional inventories of data that would contribute to the needs of future research at the site; and
* Research associated with comparable management situations on-site.

Table III-3

Estuarine Sanctuary Related Research, Past and Current, Conducted at the Deal Island Wildlife Management Area

MARYLAND ESTUARINE SANCTUARY PROGRAM RESEARCH TOPIC	DEAL ISLAND RELATED RESEARCH ACTIVITIES/ STUDIES
•Fisheries	•Identification and evaluation of research priorities for the Bay region/Monie Bay.
•Wildlife	•Identification and evaluation of research priorities for the Bay region/Monie Bay.
*waterfowl	•Annual reports on waterfowl distribution and abundance; designed principally for management objectives. Some species started in 1963. Data provides indication of species, density and acreage. Data may provide indication of trends only where statewide trends are evident in statewide totals.
*endangered species/ non-game species	•Bald eagle habitat evaluation available at Baywide scale. Criteria include availability of nesting habitat. •Statewide inventory available for selected endangered species indicating the status and distribution of species, nesting, territory, activity, reproduction, long-term and short-term dispersal. •Osprey productivity studies in 1978. •Breeding bird surveys. •Habitat requirements of forest birds. •Complete listing of bird use at all seasons; banding since 1968. •State Atlas Survey - ongoing survey of blocks. •Studies of Heron Rookeries at DIWMA and Chesapeake Bay islands.

Table III-3 (con't)

Estuarine Sanctuary Related Research, Past and Current, Conducted at the Deal Island Wildlife Management Area

MARYLAND ESTUARINE SANCTUARY PROGRAM RESEARCH TOPIC	DEAL ISLAND RELATED RESEARCH ACTIVITIES/ STUDIES
•Monitoring/Fundemental Research	
*water quality	•Five year study of water quality management issues. Identifies management zones defined by salinity and other factors. Identifies research needs and project priorities for the Bay.
*vegetation	•Annual sampling of two locations on Monie Creek of aquatic vegetation. Three samples taken at each site. Sampling includes speciation volumetide measurement, invertebrates collected, water depth, bottom type. Sampling started in 1971. •Impact of management strategies on mosquito population, mergent marsh macroinvertebrates, fish and aquatic invertebrates and water tables. •Effects of mosquito management strategies on vegetation and nutrient cycling.
*geology/geomorphology	•Analysis of core samples at Cove Point, Calvert County, to prepare geological column and explain sequence of land submergence and emergence.
*archaeology	•Analysis of geomophological phemonena with aerial photography in Delaware Bay to provide preliminary evaluation of archaeological resources. •Limited investigation of shell piles at Monie Bay.

3. Past and Present Educational Activities

The MWA provides recreational uses such as hunting and trapping at the Sanctuary site but, due to a lack of funds, has not undertaken educational planning or special programs. MWA places emphasis on keeping hunters in posted areas, and otherwise serves recreational goals through management programs that maintain wildlife at levels suitable for recreational purposes.

C. SANCTUARY MANAGEMENT

1. Strategy

The DIWMA Plan and the Monie Bay Estuarine Sanctuary management plan both have as their highest goal the long-term viability of the estuarine ecosystem. The objective of the Sanctuary management plan is to provide policy and guidelines for assuring long-term protection for the site, and for compatibility of wildlife management and recreational activities with scientific and educational uses. Site management on a day-to-day basis follows the MWA mandate to assure the continuation of present wildlife uses at Deal Island. It provides for hunting, trapping, fishing, crabbing and oystering under established management principles. The Tidewater Administration joins with MWA to manage the Sanctuary portion of Deal Island as an entity in itself, ensuring that research and educational activities receive priority within the wildlife management framework.

Under this arrangement, DIWMA uses identified above are considered compatible in the Sanctuary at their present use levels. All Sanctuary uses continue to be subject to existing State laws in effect at DIWMA.* Research and education activities emphasize the established primary use of the site, in this case, wildlife management. This includes little or no conflict with the overall preservation objective of the Program at the site. Very little active habitat manipulation has occurred in the past and little is expected in the future. The Program can enhance the research and public education aspects of wildlife management as applied in similar areas

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*Articles 4 and 10 of the Natural Resources Code; Regulations: Title .08; Subtitle .03, Chapter .01, Wildlife Conservation and Title .08; Subtitle .02, Chapter .22, Fishing in Non-Tidal Waters.

of the Eastern Shore. This would include techniques such as the construction of shallow ponds and small impoundments and control of undesirable vegetation.

Altogether, land management as practiced at DIWMA and by adjacent property owners in the Monie Bay watershed, and water quality management at Monie Bay under State programs are compatible with the goals of the Estuarine Sanctuary Program.

Administratively, there is a shared, cooperative approach to decisions made regarding Sanctuary activities at the site. This arrangement allows incorporation of Sanctuary goals, research and educational plans, and funding implications into proposed actions either organization believes is significant to an area of responsibility held or shared by the other. The site is therefore managed with the best creative ideas achievable by collaboration using the goals of the Department of Natural Resources.

This management plan is viewed as an action document by the Sanctuary and Site Managers and advisory committees to guide them in planning, and in other activities necessary for achieving Sanctuary goals.

2. Administration

a. /Sanctuary Manager/

The operation of Sanctuary Program activities at Monie Bay is conducted jointly by the permanent DIWMA manager, WMA staff and the Sanctuary Manager. The Sanctuary Manager is the main coordinator of site activities with the overall Program plan. His management priorities reflect the Md. DNR and more specifically, the Maryland Coastal Zone Management Program. His responsibilities include:

- Preparing required budgets, reports; handling public relation activities; maintaining necessary support information for the Site Manager and staff;
- Hiring and, if necessary, training Sanctuary staff to carry out specific administrative duties;
- Assuring implementation of site programs and plans;
- Working with members of the Site Advisory Committee on local issues and other matters which affect the relationship of the Sanctuary Program with the community; and
- Representing the Monie Bay site Estuarine Sanctuary Program in public on behalf of the State regarding issues, questions, and projects that affect the Sanctuary.

b. /Site Manager/

The DIWMA Director, as Site Manager, provides continuous site leadership for Sanctuary activities. Technical and public education support are provided by the MWA Eastern Regional Office. The chiefs of the Wildlife Field Service and the Wildlife Management Service provide administrative supervision responsibilities for the MWA Director.

MWA is responsible for integrating Deal Island's administrative and planning functions with Sanctuary program development. MWA uses as its overall guide the Maryland Fish and Wildlife Comprehensive Plan. This five year (1983-7) general program of action is comprised of strategic and operational planning for all valued fish and wildlife species. This Plan is complemented by an assessment of the current and future conditions of fish and wildlife entitled, Inland Fish and Wildlife Management for the '80's. This draft report includes objectives, problems and strategies for MWA's organizational subdivisions regarding featured species.

The site manager handles the day-to-day work load of DIWMA activities. Annual work projections and budgets are included in the five year Deal Island Wildlife Management Area Plan. The Plan calls for accomplishing the following:

* Provide a program incorporating basic priniples of wildlife management and hunting safety in the Area;
* Provide a system of competent and consistent law enforcement for the protection of fish and wildlife resources and boating interests;
* Use the land for hunting at recreational levels, compatible with other land uses and within the carrying capacity of the land, and for scientific and educational purposes;
* Assess and seek to lessen or eliminate adverse impacts from public and private projects to fish and wildlife resources;
* Provide information to the public on these resources;
* Prevent certain species, i.e., rails and ducks, from being threatened or endangered; and
* Re-establish other wildlife as viable species.

c. /Site Advisory Committee/

The Monie Bay Site Advisory Committee (SAC) is the public forum through which the two agencies managing the site participate with local citizens to:

- Evaluate whether local land or water uses threaten the environmental quality of the Sanctuary site;
- Determine the nature of local problems arising due to the Sanctuary's educational or research programs;

- Make recommendations for research and educational projects which are of value to the local community;
- Attempt to resolve, if appropriate, user conflicts; and,
- Review the progress of the site plan.

The SAC is involved in overall Program matters through their representative on the Estuarine Sanctuary Management Committee.*

It is acknowledged by all parties that regular meetings of the SAC are extremely beneficial to maintaining Program focus and timely handling of administrative matters which require the attention of all parties. The SAC chairman, Sanctuary Manager and Monie Bay site manager are jointly responsible for setting agendas and assuring follow-up on administrative actions. The SAC has up to sixty days of review time before taking a position on Program policy or other detailed actions requiring consultation with their constituents.

3. Policies and Guidelines

The basic responsibilities for site management include:

- Development and operation of an annual site plan, including a budget sustained by legal arrangements, key reports, etc.;
- Acquisition of funds to support desired research management and educational activities at the Sanctuary and participation, when helpful, in the consideration of plans or proposals of other programs which help achieve Sanctuary objectives; and
- Action upon consistence or compatibility issues arising from any of the above with current or proposed uses at the site.

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*See Appendix A for listing of advisory committee members.

a. /Site Plan/

Sanctuary Program activities are expected to place some additional, though undetermined, demand on DIWMA facilities and Monie Bay site natural resources. In order to balance protection of site resources with wildlife management, research and education activities, an annual site plan is developed.

DIWMA activities have clearly defined objectives incorporated under a plan for assessing accomplishments of those objectives. Annual Sanctuary objectives and plans are developed cooperatively by the MWA and the Sanctuary Manager. The site plan is intended to assure that anticipation of issues, planning time, and decision options are undertaken in the best interests of the Sanctuary Program and the DIWMA. In the event that DIWMA programs change their goals or direction, some Sanctuary activities may be affected. Any changes are to be consistent with the overall Monie Bay Estuarine Sanctuary goals.

Although the form and content of the site plan is the responsibility of MWA staff and the Sanctuary Manager, the planning strategy for the first year should address:

- Acceptable limits of use to existing facilities by Sanctuary involved personnel and visitors, including use of the clubhouse, boat ramps and field equipment;
- Conversions to facilities attributable to planned Sanctuary activities;
- Control of visitor access under present and future site conditions, in particular, reconstruction of the Monie Creek boat ramp;

- The impact of the reconstructed boat ramp on the site, including the parking arrangements necessary;
- Wildlife and Tidewater Administration staff roles, and commitments to Program areas and projects;
- Anticipated issue areas; for example, potentially incompatible activities; Sanctuary activities of concern to the surrounding community; issue-areas of high priority for research and education which lack funding;
- Monitoring of plan implementation;
- Key site locations requiring special management attention;
- Coordination activities with other educators and researchers; and
- Research and education priorities and methods for implementing them.

The site plan is a public record of the shared Program responsibilities between the Wildlife and Tidewater Administrations. It describes how they intend to operate given their funding and staff levels for that year. It also includes commitments from other site users as appropriate.

The site plan will be consistent with the Maryland Coastal Zone Management Program and the Deal Island Wildlife Management Plan.

b. /Site Plan Budget/

The operating budget for administering the Monie Bay Sanctuary is derived from both State and federal funds. There is an annual NOAA Operation Grant to the Tidewater Administration, matched in-kind by the State. DIWMA programs are supported from available revenue received from the Wildlife Administration's self-supporting activities, i.e., hunting licenses.

Of the yearly $50,000 Operation Grant to the State, one-half is used to pay the salary of the Sanctuary Manager. One-Quarter is used to support high priority work efforts proposed by the MWA staff that help fulfill Program objectives which would otherwise go unfunded.

The MWA reviews the Deal Island budget through its Comprehensive Plan Overview Committee. They apply program priorities to available revenues through a two year lead-time plan.

Budget coordination for the site involves the Sanctuary Manager participating in the review of the annual DIWMA Plan, and the WMA being involved in the Sanctuary's Operation Grant budget process with NOAA each year. The Sanctuary advisory committees are also involved in this task.

1) (Project Funding Process)

Project proposals developed by the WMA under the Deal Island Plan receive close review under the Sanctuary Program for their consistency.* The Sanctuary Manager and advisory committees have a role in reviewing relevant proposals and in suggesting means for obtaining funding or other support needed to serve worthy projects.

Proposals initiated outside the WMA are channeled through the Sanctuary Manager to the WMA Administrator. WMA staff review each proposal, as does the Sanctuary Manager and Tidewater Administration. It is the role of the Sanctuary Manager to provide for a consistency review, if necessary, for any proposed project or activity and the MWA to determine compatibility with their Management Plan. Either the Estuarine Sanctuary Management Committee or the Site Advisory Committee may serve as a forum to work out problems associated with proposals.

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*See Project Proposal Form, Appendix H.

2) (Documentation)

The Sanctuary Manager and the WMA prepare all legal documents and supporting paperwork necessary for site plan implementation. A Memorandum of Understanding between the Wildlife Administration and the Tidewater Administration is the basic agreement on all major points of responsibility needed to set the Program into action at the site. It also serves as the framework for considering future administrative responsibilities for either agency under their respective mandates on significant Program points.

c. /Research Planning/

The relatively undisturbed condition of the Sanctuary site offers special opportunity to study a brackish Eastern Shore wetland ecosystem. The resource base has already been described for its comparative value in research projects. The listing of topics in Table III-4 suggests types of research that can reasonably be expected to be undertaken at the site for Sanctuary purposes. The topics are representative of:

- Analysis of on-site resources for management uses (e.g., wetland succession or mosquito control);
- The need for basic information on the site (e.g., water quality data);
- Updating existing inventories to identify changes (e.g., update of vegetation types from new aerial photography);
- Follow up to existing research activities in adjacent areas; and
- Research addressing existing management problems.

d. /Education Planning/

The Monie Bay site offers some special opportunities not found in many other places around the Chesapeake Bay. Education programs can take advantage of these special opportunities, focusing on the responsibility

Table III-4

SUGGESTED RESEARCH OPPORTUNITIES AT
MONIE BAY ESTUARINE SANCTUARY SITE

Topic	Research Activity	Rationale
•AQUATIC ECOLOGY	•Population census of principal fish species in Monie Bay.	Baseline data needed on commercial fisheries at Sanctuary.
	•Ecological studies of spawning conditions of spot, croaker, weakfish and menhaden.	Pursue understanding of ecological conditions of principal spawning fish.
	•Analysis of environmental factors affecting submerged aquatic plants.	Monie Creek and Little Monie Creek offer relatively undisturbed conditions with extensive submerged aquatics, providing an opportunity for gathering baseline data on populations and biology of aquatics.
•MARSH ECOLOGY	•Develop and interpret recent airphotos to determine changes in wetland and upland cover; compare to 1971 photos.	Updated maps show dynamic nature of wetlands, including changes in upper inland boundary and shoreline.
•MARSH ECOLOGY	•Establish permanent study plots to determine patterns of specie changes in major wetland type; coordinate with study plots at other sites.	Test concepts of vegetation succession; Provide indication of level of wetland erosion and land subsidence.
	•Phragmites Control Program	Recent invasion of Phragmites is altering the species composition of areas of marsh, especially borders.
	•Analysis of vegetation changes in marsh as a result of effects of mosquito management (changes in water table, litter, etc.)	When undesirable mosquito speices invade ditches and wetlands, breeding may be diminished by manipulating water levels.

Table III-4 (con't)

SUGGESTED RESEARCH OPPORTUNITIES AT MONIE BAY ESTUARINE SANCTUARY SITE

Topic	Research Activity	Rationale
	•Determine effects of burning in wetlands that have been managed for mosquito control through altering water levels. Identify extent of damage to peat when water level is lower and plant litter increases. Determine germination and seedling establishment requirements of these species for various substrate, textural and moisture conditions. Determine effect that alteration of water tables has on the response of wetland vegetation to burning. Of particular concern is potential damage that would result from a deep peat burn on wetlands where water table has been lowered by ditching.	Winter burning of brackish marshes is extensive in Somerset County. The effects are not well understood.
•UPLAND ECOLOGY	•Evaluation of marsh management practices (e.g. ditching, pond excavation) on migratory waterfowl. •Determine populations of endangered species. •Determine the best inventory procedures for birds, mammals, reptiles and other Bay-related animals. •Determine which management practices for muskrat and nutria produce best long term yields.	Enhance present wildlife management programs.

Table III-4 (con't)

SUGGESTED RESEARCH OPPORTUNITIES AT
MONIE BAY ESTUARINE SANCTUARY SITE

Topic	Research Activity	Rationale
•UPLAND ECOLOGY	•Develop census data for snipe comparable to that existing for duck.	
	•Inventory Sike deer in forest area; could include construction of exclosures to perform studies analagous to these at Rhode River Site.	Determine extent of any vegetation destruction.
	•Survey breeding birds in all wetland and upland habitats.	Lack of comprehensive data on composition of bird community in upland and wetland areas of the site.
	•Analysis of upland birds and comparison of species associated with Monie Bay marshes with those present on Western Shore.	Develop comparative analysis at Sanctuary sites.
•BASELINE DATA	•Develop watershed analysis of areas influencing site, watershed delineation, landuse, runoff and water quality.	Influence of watershed activities needs to be determined on-site; Develop comparative data base at sanctuary sites.

man has for maintaining a proper balance in such an estuarine environment. The DIWMA provides an established base for the study of wildlife, including population and habitat status and trends.

The WMA has an active role in the organization of educational programs that focus on these strengths. The approach is one that emphasizes use of a resource within WMA conservation principles, with hunting and trapping as specific topics for educational activities. The Sanctuary education program can provide, for example, factual information in the controversial area of trapping. It can also provide information to those who have an immediate need for an understanding of the Monie Bay ecosystem and their impact on it. Additionally, it can provide education activities emphasizing marsh ecology - its inherent values as well as management potentials.

The education program is to be comprehensive; recommended activities and materials include:

- Educational aides (slides, brochures, etc.) which focus on marsh ecology and management, for use on-site as well as at other sites in the Estuarine Sanctuary Program;
- A Sanctuary educational center, probably using existing structures in the DIWMA vicinity. Such a center, in keeping with the special offerings of the Monie Bay site, would focus on the interaction of Bay and marsh life and on "how to" activities, such as duck hunting, crabbing, fishing and wildlife photography. The center could serve as the base for overnight visits, including overnight canoe trips;
- Activities in the areas of sportsmanship, ethics and wildlife conservation. This can help the MWA educate potential users

in the values that underlie appropriate behavior and enhanced respect for estuarine environments;

- Field equipment and teaching aids that stress marsh management and ecology, such as for the development of educational programs focusing on furbearing animals, their biology and habitat, and on the art and effects of trapping. Once in place, this kind of program can be coordinated through local community colleges and offered to interested audiences;
- Additional, specific topic educational aids, such as slide shows and printed brochures that emphasize the important balance between management and use as these affect marsh ecology;
- Cooperation with local educators in designing teacher-training and field-education experiences at the Monie Bay site. Such programs can help turn the attention of local schools to the benefits of using nearby estuarine ecosystems to illustrate some basic scientific and social precepts. Excellent models for such teacher training exist already, such as the Sea Grant-funded teacher-training program staged by the Upward Bound Program, University of Maryland Eastern Shore. Other projects could be brought together by the Sea Grant Program, the Chesapeake Bay Foundation, the Smithsonian Chesapeake Bay Center and the University of Maryland Eastern Shore. The Sanctuary provides an ideal location for the further development of such programs.

D. SITE MANAGEMENT PLAN POLICIES AND GUIDELINES -

CONSISTENCY DETERMINATIONS

1. Strategy

Consistency determinations under the Sanctuary Program are the joint responsibility of the MWA and the Sanctuary Manager, with advisory committee assistance as appropriate, where current or proposed activities might appear in conflict with this site plan. As consistency issues arise from time-to-time, it is the policy of this Program to use open meetings and other communications between members of the Program and the proposers, and the affected public if so determined, to reach an outcome. This is intended to assure all significant viewpoints are heard, a productive exchange is promoted and that the outcome reflects consideration of the best options by a decision method all understand.

The Estuarine Sanctuary Program policies and guidelines for the multi-site system (Chapter I) and the Monie Bay site in particular, must be addressed and results recorded in any decision of significance affecting Program administration. When necessary, the dispute settlement provisions of the interagency Memorandum of Understanding are used to assure that a significant issue is not allowed to go unresolved indefinitely. Areas where consistency issues may be expected are: public access to the site; resource preservation and site integrity from human activities; and capital improvements.

a. /Public Access/

The Monie Bay portion of DIWMA is used minimally by the public. This is due in part to its remote location, its inclusion in a protected management area, and inhibiting marshy lowlands compounded by a high water table. All portions of DIWMA, however, are perceived by WMA to be meetingan

important need in the demand for recreational waterfowl areas. The residential development and expansion in recent years in the metropolitan Baltimore-Washington area has increased the number of waterfowl hunters who must travel to pursue their sport. However, most of the marsh on the Eastern Shore is set aside first for commercial hunting, leased hunting, and is under private control. DIWMA provides hunters who cannot afford commercial guide services, or lease rights, a place to hunt. The future, with increased leisure time and personal mobility should intensify the need for public access to quality hunting areas such as Deal Island.

The MWA takes a self-regulating approach to the hunter. For most recreational hunting this arrangement has proved satisfactory. Formal access control is imposed on trapping through leases and on hunters during deer hunting season. Trappers and hunters usually pass onto the site with the permission of adjacent property owners, or straight off the roadsides. Others approach directly from open water by boat.

Other recreational use of the site is minimal; education and research visits are few. A lack of access improvements at the site contributes to low use. MWA staff and the public do have access by boat from nearby Dames Quarter, south-west of the Sanctuary and about a 20 minute ride. This route can be limited in winter weather. A deteriorated boat ramp exists on Monie Creek at the end of North Drawbridge Road, within the site boundary. Improved boat launching facilities at this location are supported by both administering agencies for recreational, research, educational, management and enforcement purposes.

Improved access, such as the boat ramp, may increase total use of the Sanctuary site somewhat, though its effect is more likely to be one of concentrating current access to these new areas, away from road and adjacent private property entry points.

Generally, the MWA encourages public use of the DIWMA although it is apparent that additional capital improvements and a vigorous public relations program are needed to substantially increase yearly visitations.

It was noted in the FEIS that additional hiking, boating, etc. could result in somewhat greater noise, litter, soil compaction, water pollution, erosion, disturbance of breeding seabirds and other forms of habitat degradation. It is therefore Sanctuary policy that:

- For safety reasons and to keep visitation impacts within acceptable levels, the location and levels of human activities on the site will be controlled by:
  * Providing guided access, i.e. tours, to the site under any recreation program non-hunting related;
  * Using a permit system for monitoring research activities; and
  * Directing spontaneous visitation to the other portions of the Wildlife Management Area.
- Close ties with adjacent property owners, hunters, etc. through the site advisory committee, using their ideas and support in assuring that proper conservation practices by more frequent users continue at the site; and
- Sanitation and litter control be assured at all public access points.

b. /Site Preservation/

The overriding intent of the Sanctuary Site Plan is to provide guidelines for the permanent protection of the Monie Bay estuary and its tributary watersheds. The Memorandum of Understanding between the MWA and the Tidewater Administration emphasizes the site's long-term use as a

carefully managed and protected entity in the DIWMA. This policy is elaborated below.

1) (Sanctuary Boundary)

The Sanctuary boundary remains as depicted in the FEIS, with the Monie Bay water boundary drawn across a point from Victors Creek to Marsh Gut. This boundary should neither cause problems for normal Sanctuary Program activities nor expose the area to incompatible activies. DNR will include and preserve only State-owned DIWMA property within the site boundary, restricting future acquisition to the Little Creek watershed where property owners are willing to sell, or donate land to DNR as an easement. Both agencies agree on desirable lands for future acquisition. Presently, these areas are hunted and it is expected that current Sanctuary policy, which includes hunting, would apply.

It is MWA policy to maintain good contact with adjacent property owners and work with them to assure that the Monie Bay watershed is not degradated.

2) (Land and Water Uses)

All activities permitted or prohibited at the Monie Bay site as described in the FEIS, are included in the site plan unchanged. The Site Advisory Committee and the Estuarine Sanctuary Management Committee periodically review DNR monitoring of activities at the Sanctuary site. Use of the site for scientific and educational purposes related to estuarine studies and all such non-destructive work is encouraged. Existing activities such as hunting, trapping, boating, bird watching, picnicing, commercial and sport fishing, which are compatible uses, continue subject to State law and this site plan.

Wildlife management activities at DIWMA are not anticipated to have significant impact on the site. The DIWMA Plan emphasizes the needs of wintering migratory fowl and the breeding and nesting of ducks. The DIWMA provides a growing number of user days devoted to hunting recreation, primarily for waterfowl. A small amount of these days are spent on upland game hunting. In addition, a large number of user days are realized from fur trapping. To meet this need, MWA has set specific goals and objectives around maintaining or developing habitat for bobwhite, doves and dabbling ducks.

Dabbling ducks, particularly black ducks (Anas rubripes), are common residents and contribute significantly to huntable Bay wildlife populations. Canada geese, also traditionally found here, and muskrats, the dominant furbearer, are included in the DIWMA Plan to provide suitable habitat because of the appropriateness, ease and relative, low expense involved. As the DIWMA is also used for upland hunting of bobwhite and doves, it is desired to keep these areas in a field successional state or open pine forest; this requires no major deviation from the existing use pattern. Nesting areas are encouraged adjacent to marsh where some small grain patches can also be maintained.

In the DIWMA Plan, wildlife management activities are developed around the major land characteristics, that is, wetlands and uplands. Deal Island is divided into compartments (wetlands become Compartment I and uplands become Compartment III) for administrative purposes.*

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*See Figure III-B for compartment designations in the Sanctuary portion of DIWMA.

Each compartment has selected wildlife management objectives:

- Compartment I-develop existing habitat for dabbling ducks (See Appendix I for guidelines);
- Compartment III-develop existing habitat for bobwhite, with secondary considerations for dove (See Appendix J for guidelines).

Little intensive management takes place in either compartment within the Sanctuary.

(a) DIWMA Plan Compartment I Management Strategy -

The current assessment by WMA is that the wetlands do not have the proper amount of permanent water to insure adequate resting and escape cover for wintering and migrating waterfowl. In addition, large unbroken stands of monotypic vegetation (particularly Needlerush) exist which afford little value to waterfowl due to their inaccessable interiors.

While highly desirable food plants do occur in good numbers on certain sections of this compartment, their distribution is unequal, thereby inhibiting optimum use by waterfowl. The major reason for the existence of this limiting factor is the unavailability of suitable growing sites. MWA believes that resolution of the problem of water occurrence will contribute significantly to the availability of food to meet the needs of wintering and migrating waterflow populations. In addition, breeding waterfowl are expected to benefit directly as their cover and energy requirements are better met.

Active management techniques are therefore intended to promote high value food species and establish additional permanent water in areas where the greatest disparity exists. Sites for such efforts are chosen so as to disrupt large monotypic stands of vegetation whenever possible. Five

techniques are employed: pothole blasting, mosquito control, dugout ponds, burning and impoundments. Those management techniques which might occur in the Sanctuary include: possible digging of small shallow ponds in high phase marsh; control of undesirable vegetation; and the creation of small impoundments.

(1) Dugout Ponds - would probably be created by using a dragline or some other similar type of equipment. Sites would be selected to have minimal environmental impact. They are generally less than 1/2 acre in size, and distance from the estuary being at least 50 feet from any tidal gut or creek. They tend to revegetate rapidly, are extremely important to wetland wildlife and help in controlling saltmarsh mosquitos. They are very shallow (less than 2 feet deep) and spoil disposal is accomplished by scattering it throughout the marsh. Past experiences have been successful.

(2) Vegetation Control - a practice not yet initiated at DIWMA is the control of undesirable vegetation with herbicides. Concern lies with the common reed (Phragmites australis). WMA will not initiate any efforts at Deal Island until guidelines are forthcoming from the U.S. Fish and Wildlife Service.

(3) Small Impoundments (< 200 acres) - require steps be taken to minimize impact on the estuarine system. No dendritic stream patterns are to be interrupted in the creation of an impoundment. In addition, all environmental concerns are to be addressed in the State wetlands permit process so that the planning, creation and management of such an area would address the whole estuarine ecology and not just wildlife.

WMA believes a 50:50 ratio of water to land is needed in Compartment I in order for optimum cover to occur. In addition, water requisites indicate a minimum of 2754 square meters of water in a given hectare (2.47 acres) of habitat.

Both the MWA and the Tidewater Administration acknowledge that disturbing the natural processes of the Sanctuary would have consequences to activities encouraged under the intent of the national Sanctuary Program. Therefore, any active management techniques applied at the Sanctuary site will be within limits determined acceptable to both administrations and NOAA. In general, compatability with the Estuarine Sanctuary Program shall mean non-interference with the natural, dynamic pattern of the ecosystem, and having localized, temporary adverse impacts only. Before any habitat improvement techniques are used, base line data will be collected for all agencies concerned on edaphic conditions, water chemistry, floral and faunal composition, etc. of selected representative areas as far as practical. Habitat improvement projects, as is the case with other activities, are reviewed through the site planning process. In this way they are merged with and monitored under the research and education portions of the Program.

(b) DIWMA Plan Compartment III Management Strategy -

Before Deal Island was acquired as a wildlife management area, the uplands portion was in agricultural crop production. This has lead to a very young, low standing, low density vegetative structure that produces some food and brood cover but lacks the nesting cover and preferred food items for ducks. Otherwise, the limiting factor in this compartment is insufficient cover of the proper density. The MWA approach is a general opening up of the land to improve the quality and quantity of both food and cover, and to improve hunter access as well.

(1) Mowing - on DIWMA land close to the Sanctuary there are wheat fields that are sown and mowed to contribute food supply for birdlife. This effort also involves hedgerow improvement for wildlife cover. Low

shrubs and volunteer pine clumps are encouraged for wind and erosion barriers as well as to contribute to overall diversity and interspersion.

(2) Burning - has been used by the MWA in the past when hazardous conditions for fire control have occurred. Burning has not been needed in recent years as litter has not built up and become a fire hazard. Sporadic burning by trappers is done to improve access, and some think it improves habitat for muskrat. However, the cumulative effects of yearly burning are not clearly understood. It has long been known that periodic burning results in a decrease in the soil of organic material, retardation of plant succession, promotion of succulent vegetation suitable for green forage, creation of shallow potholes and the release of seeds from certain plants. However, recent observations have led MWA to speculate that burning, too, often can result in severe dessication of root systems, possible destruction or reduction of invertebrate populations, severe reduction in suitable waterfowl nesting cover and other adverse effects.

A State permit is required for all burning,* thus allowing the WMA to direct the time and location of burning away from hazardous conditions which enable wildfires to start. The policy now is not to permit burning more than every three years. Enforcement of this policy is complicated by the ease of access to the DIWMA and by the sense of beneficial purposes attributed to burning by some trappers.

(3) Forest Management - has not taken place at the site. The woodland within the Sanctuary is not viewed as having commercial potential, although logging does take place on surrounding properties. The forest management

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*See Appendix K for Bid Form which includes information on assistance, licensing and burning.

plan is to leave the woodland as is; MWA owns some upland that possibly, in the future, could be harvested.

(4) Trapping - is a principal commercial and recreational use of the DIWMA. Trapping for muskrat, raccoon and nutria take place through a bidding system conducted by the WMA. Area trappers participate in a sealed bid auction for trapping rights on defined parcels. Two tracts, A and B, fall within Sanctuary boundaries. These trapping units are shown in Figure III-B. The boundaries were established by historical use and not upon population or resource evaluations.

The season for raccoon commences December 1st and closes March 15th. The muskrat season starts December 15th and closes March 15th. However, furbearer seasons are frequently subject to change. Bids for these tracts have traditionally been high, suggesting that populations are good. Observations over past years suggest that populations are not being overly depleted and trapping minimizes the possibility of "eat outs" that have occurred elsewhere on the Eastern Shore.

Sanctuary program activities are not expected to have significant impact on the site or on those activities presently enjoyed on Monie Bay.* Those uses are specifically protected under the interagency Memorandum of Understanding. All pertinent local, State and federal plans or policies, as stated in the FEIS, remain in force.

3) (Capital Improvements)

Establishment of the Sanctuary may result in some disruption to the environment through construction of a boat ramp and parking area, possibly a marsh boardwalk, educational center, nature trails or related activities.

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*See pages 47-50 and 55-59 of the FEIS.

All capital improvements are intended to help carry out the purposes of the Estuarine Sanctuary Program with a very minimum of adverse impacts on site resources. An environmental assessment and the appropriate, approved permits will be required before money is granted for any construction. Where capital improvements for improved public access are considered, the Maryland Wildlife Administration, Tidewater Administration, and Capital Programs Administration will coordinate the assessment, design, permit review and implementation steps for DNR. Any affected local property owners are to be notified.

The objectives of capital improvements envisioned for the Sanctuary are to direct visitor use away from more fragile site areas and to provide visitor accommodations and basic tools for research and educational activities at the site.

The proposed boat launching facility on Monie Creek will be a concrete boat ramp with catwalks, a turn around area and parking lot. Low profile riprap will be in place for protection from erosion, along with drainage piping. This facility will be the only direct public access to the site over land in the immediate future. As such, it will be multi-purpose, serving the needs of the general public and WMA as discussed previously. Total cost of the facility is anticipated to be $50,000; construction is anticipated to begin after July, 1983.

No visitor accommodations are available within the Sanctuary. The Wildlife Manager's house at DIWMA offers only limited possibilities for overnight stays. The presntly unoccupied portion of the house could be renovated to provide a facility for people visiting the Sanctuary. Providing adequate accommodation for independent researchers and larger student groups could enhance research potential at the Sanctuary as the site is a considerable distance from population centers.

Cooperative agreements regarding accommodations may be investigated with State, federal and private groups managing facilities in the vicinity of the Sanctuary. In southern Somerset County, some thirty miles from the Sanctuary, the Maryland Ornothological Society manages the Irish Grove facility at Rumbly Point, south of Marion. The house offers some limited accommodation.

A permanent research and education facility is also needed for the Sanctuary. The nearest laboratories, for instance, are centered at the University of Maryland, Eastern Shore Campus and at Salisbury State College.

Other research institutions, agencies and refuges conduct and support research on the Eastern Shore. Some research activities need support and assistance from programs such as the Estuarine Sanctuary Program. For example, the Delmarva fox squirrel relocation program is seeking suitable sites to establish this endangered species.

Arrangements for accommodations and activity facilities during the first year may be provided using a combination of facilities existing at DIWMA and in the Somerset County community.

Other suggested capital improvements including interpretive trails, improvements to existing road beds and a marsh boardwalk, are principally intended to accommodate researchers and/or to conduct e ducational activities. Each need will be assessed and action should be taken in the first year of Sanctuary operation. The objective is to provide use of the site at levels that demonstrate only acceptable impacts. Until such capital improvements are made, impacts on Sanctuary resources from visitor activity are to be minimized by using existing roads; no trails presently exist. Access routes, presently Deal Island and North Drawbridge Roads, are not expected to change.

E. CONCLUSIONS

1. Site Location

*The present Monie Bay site boundaries and land use management approach are satisfactory for Estuarine Sanctuary purposes. Included are 3,005 total acres, with 756 acres of State waters. An additional 471± acres are under consideration for acquisition in the Monie watershed.

2. Site Organization/Facilities

*The DIWMA director serves as Site Manager. The Eastern Shore Regional Office, and the chiefs of the Wildlife Field and Wildlife Management Services constitute the rest of the permanent Sanctuary Staff.

*The Monie Bay Site Advisory Committee is a new and important link between the managing agencies and the surrounding communities. Local issues can now be addressed through this group.

*There are no facilities for research or education activities at Monie Bay, nor suitable possibilities on the rest of the Deal Island Wildlife Management Area. The Somerset County vicinity may offer some housing for visitors, lab space and equipment for such activities initially.

*The Maryland Wildlife Administration and the Tidewater Administration will use a formal agreement to provide for the legal operation of the Program at Monie Bay, to coordinate their respective responsibilities, and to work out Program legal contingencies.

3. Site Planning/Research and Education Activities

*The Sanctuary site plan, as presently developed, presents no conflict with the DIWMA Plan, local plans, or the State's Coastal Zone Management Program.

*Deal Island Wildlife Management Area's research history emphasizes waterfowl and related vegetations studies.

*The Maryland Wildlife Administration has not had the funds to establish an education program at the Area. Under the Sanctuary Program, DNR will initiate education activities in wildlife conservation and marsh ecology.

*Neither Sanctuary nor DIWMA Plan activities are considered to have significant adverse impacts on site resources. Careful consideration, however, is required to mitigate the impacts of any proposed wildlife management techniques at the site.

4. Public Access

*Visitor use of the site is low, and is hunting and trapping oriented. Access is by boat, through adjacent private property, or off Deal Island area roads.

*An access route involving a reconstituted boat ramp and parking area is proposed under the plan and probably can be constructed within the next year.

*Directed use to adjacent DIWMA areas should minimize the impact of visitor traffic and educational activities on site resources, yet provide the public with worthwhile experiences at the estuary.

F. RECOMMENDATIONS

1. Site Preservation

*DNR should continue to promote sound watershed management practices with property owners adjacent to the DIWMA. DNR should pursue the voluntary acquisition of the four land parcels noted in the site plan. They will add mostly upland in the Little Creek, Little Monie Creek and Marsh Gut portions of the Sanctuary.

*A satisfactory system for monitoring the water quality and user levels in other sensitive site areas should be in place, helpful to the Sanctuary staff in determining enforcement problems, access needs and general site supervision requirements.

2. Site Management

*A portion of each year's operation grant from NOAA to DNR should continue to be passed through the Tidewater Administration to the Wildlife Administration for Sanctuary purposes.

*Equipment, such as boats, canoes, motors, etc., are the priority needs of the MWA in using Operation Grant funds the first year.

*The site Advisory Committee should continue in its present form, meeting at least quarterly. They should be guided in their activities by a yearly site plan outline which they help prepare.

3. Site Activities/Planning

*Estuarine Sanctuary Program research and education priorities should be drafted immediately upon adoption of the site plan.

*The Monie Bay Site Plan should reflect consideration of both Wildlife Administration and Tidewater Administration plans and budget realities. Other major organization programs should be approached to compare trends and needs for coordination purposes.

*DNR should consider entering into agreements with area academic institutions, agencies, other organizations, or individuals to provide research or educational facilities until permanent facilities can be guaranteed. Rennovation of the MWA clubhouse at Deal Island should be given serious consideration in any site facilities plan, as should the potential for the use of local buildings. The development of an education/research center should also be based on having adequate public access, including roads and parking. This matter should be pursued once the site plan is adopted.

*The research and education plans of the Program should be carefully coordinated with the trapping and hunting seasons to assure potential site use problems are anticipated and addressed.

4. Public Access

*Public use of the site should remain at approximately current levels until the suitability and need for boardwalks, visitor housing, and other facilities can be determined.

G. REVIEWER'S WORKSHEET FOR THE CHESAPEAKE BAY ESTUARINE SANCTUARY PROGRAM IN MARYLAND, MONIE BAY SITE PLAN (DRAFT)

1. Site Selection Background:

Comments

2. Site Use and Existing Plans:

Comments

3. Sanctuary Management:

Comments

4. Consistency Determinations:

Comments

5. Conclusions:

Comments

6. Recommendations:

Comments

_____

_____

_____

7. Overall/Other:

Comments

_____

_____

_____

8. Level of Plan Support: (May I contact you about problems you raise?)

Yes ☐ No ☐

I/We support the Plan in its present form.

I/We support the Plan with modifications:

_____

_____

_____

I/We do not presently support the Plan because of these problems:

_____

_____

_____

Name _____(affiliation)_____

Address _____

Telephone _____

PLEASE RETURN TO: Scott Brumburgh, Estuarine Sanctuary Manager
Tidewater Administration
Md. Dept. of Nat. Res., Tawes Bldg., C-2
Annapolis, MD 21401 tel: 301/269-3382

DEADLINE FOR COMMENTS: ~~March 31~~ MAY 30, 1983

APPENDIX A

MARYLAND ESTUARINE SANCTUARY PROGRAM
ADVISORY COMMITTEES

Estuarine Sanctuary Management Committee

James Backstrom
Md. Science Center

Dr. Rita Colwell
Univ. of Md. Sea Grant Program

David Corley and Jack Greer
University of MD Sea Grant Program
(alternates)

Dr. Eugene Cronin
Chesapeake Research Consortium

Steve Dawson
Maryland Wildlife Administration

Richard Gardner
Chesapeake Bay Foundation

Ron Gatton
National Marine Fisheries Service
Coastal Resources Advisory Com. Rep.

John Groutt
Univ. of Md., Eastern Shore
Upward Bound Program
Monie Bay Site Advisory Com. Rep.

Sally Gucinski
Rhode River Site Advisory Committee Rep.

David Pittinger
National Aquarium in Baltimore

Susan Synder
Div. of Instruction/Off. of Admin.
Md. Dept. of Education

Russell J. Heyde
Arlington Echo Outdoor Educ.
(alternate)

Dr. Kevin Sullivan
Ches. Bay Center for Env. Studies

Dr. Dennis Taylor
Univ. of Md. Center for Env. & Est. Studies

Frank Christhilf (Ex. Officio)
NOAA/OCRM

Monie Bay Site Advisory Committee

Langford Anderson
agricultural interests

David Barnett
watermen

Dennis Bradford
lower Little Creek land owners

Robert E. Laird
adjacent landowners

Frederick W. Nelson
Somerset Soil Conservation District

James W. Phillips
Little Creek landowners

Steve Dawson
Md. Wildlife Administration
(site agency)

Samuel Dyke
Glatfelter Pulp Wood Co.
lumber interests

Robert S. Fitzgerald
Somerset Co. public school system

John Groutt
University of MD, Eastern Shore
Upward Bound Program

Charles Massey
Somerset Co. Administration

Richard Pollitt
Somerset Co. Plan. & Zon. Office

Michael Richardson
Md. Trappers Assn.

Chandler Robbins
Md. Ornithological Society

Rhode River Site Advisory Committee

Dr. Lloyd Lewis, Chairman
Cloverlea community

Roy S. Angell
recreational boating

Patrick Butcher
YMCA Camp Letts

Jeanette Evans
Cumber-Stone community

Sally Gucinski
science education
interests

Robert Heap
waterskiers

Mary Kasper
Citizens' Program for the
Chesapeake Bay

Y. Kirkpatrick-Howat
adjacent landowners

Lawrence Laubscher, Jr., Esq.
Bergman family

Vernon Leitch
marina owners

Minette McCullough
Md. Ornithogical Society

Dr. Kevin Sullivan
Smithsonian Institution
Chesapeake Bay Center for
Env. Studies
(site agency)

APPENDIX B

RESEARCH DIRECTIONS FOR THE
MARYLAND ESTUARINE SANCTUARY PROGRAM

The Estuarine Sanctuary Program approach to research planning is closely aligned with the most current thinking about Chesapeake Bay research priorities. A comprehensive assessment of those needs for the decade ahead is found in "Chesapeake Research - Ratings of Suggested Questions," edited by L. Eugene Cronin and G. Glynn Rountree (Sept., 1981), and its companion report, "Research Needs - Summary of Meetings of Topics in Research Monitoring by Topic Chariman," draft, (April, 1982). The topics listed with an asterick(*) on the following pages are extracted from these reports. With these topics as a starting point, a list of categories and activities are then provided. They are considered to be those areas to which the Sanctuary Program could significantly contribute.

The listing is not meant to be all inclusive, but indicative of the type of Bay research work that can be pursued under the multiple site system. Sanctuary research topics are reviewed periodically to assure the Program's annual research objectives are applicable to major work proposed in the Bay region.

POTENTIAL RESEARCH AREAS FOR THE
MARYLAND ESTUARINE SANCTUARY PROGRAM

A. Fisheries

1. Overview of management problem: The extent of stress on fisheries resources in the Bay is not fully known. There has often been inadequate basic data on aquatic biota. Scientists lack methods to adequately detect changes in the health and integrity of the biota.

2. Needed research

- Bioassay and toxicity in relation to fisheries and wildlife.*
- Improved sampling techniques for determination of population stocks and evaluation of factors affecting management of fish stocks.*
- Evaluation of the status and management of stocks of anadromous and catadromous fish species in the Chesapeake Bay system.*
- Identify and evaluate the factors affecting the reproductive success of anadromous fishes.*
- Learn the transmission mechanisms, pathological effects and life cycles of major disease organisms of Bay moluscs and crustacea.*

3. Applicability to Sanctuary Program

- Sanctuary offers unique, long term opportunities for research on impacts of spawning grounds for anadromous fish.
- Sanctuaries can offer opportunities to compare impacts from different watersheds on various spawning grounds.

B. Wildlife

1. Overview of management problems: Valuable Chesapeake waterfowl and other wildlife now require management programs for population protection and recreation reasons. Information is lacking on factors which cause changes in the long time viability of certain species and what management methods will achieve desired populations, especially where there is competing land and water use pressure.

2. Needed research

- Define the effects of management practices on available populations of migratory waterfowl.*

- Complete a census of endangered species; identify management practices that would enhnace species.

- Develop management strategies to enhance populations of Bay-produced waterfowl.

- Develop new inventory procedures for birds, mammals, reptiles and other Bay related animals.

- Define effects of management practices for muskrat and nutria that produce best long term yields.

5. Applicability to the Sanctuary Program:

- Build upon existing detailed knowledge of site resources and management practices for waterfowl management and develop management strategy to protect key resource areas at the Monie Bay site.

- Monitor existing trapping practices at the Monie Bay site to evaluate impacts on waterfowl.

- Complete census of endangered bald eagles using the Rhode River and Monie Bay and identify management practices to increase their use of the sanctuary.

- Confirm presence of swamp sparrow at Monie Bay site and develop enhancement strategies.

C. Waste Placement and Sediment Transportation

1. Overview of management problems: Significant indirect impacts on water quality in the Bay and its tributaries are attributable to point and non-point discharges. A clearer understanding of how different types of waste, such as runoff from agricultural areas and placement of dredge materials, assist the development of better management strategies.

2. Needed research:

- Develop, test and utilize a model of sediment transport for the* Bay and tributaries.

- Determine the role of sediment in transporting, storing and* releasing of selected inorganic and organic chemicals in various zones of the Bay system.

- Improve knowledge of the sources and quantities of sediments* reaching the Bay system from natural and anthropogenic sources.

- Develop engineering and ecological techniques for removal of* nutrients before they reach the Bay.

- Develop better understanding of the hydrodynamics of the* Chesapeake Bay system.

- Improve understanding of the sources and transport of* sediments in the Bay systems.

- Improve the characterization of sediments at potential* dredging sites, especially in the tributaries and at heavily used transportation areas.

3. Applicability to the Sanctuary Program

- Existing research at the Rhode River site using a tidal exchange model contributes a better understanding of hydrodynamics of Muddy Creek tributary systems.

- Watershed studies at Rhode River site contribute significantly to understanding of nonpoint sources to water quality impacts.

D. Monitoring and Fundamental Research

1. Overview of management problems: The size and complexity of the Chesapeake Bay challenges efficient monitoring to identify trends and determine adverse impacts which would lead to new management strategies. The Estuarine Sanctuary Program can contribute to this task by establishing long term, standardized comparative data at multiple sites.

At sanctuaries where there is a history of investigative research in ecological systems, contributions can be made by development and synthesis of hypotheses explaining the complexities of ecological systems. Continued fundamental research is needed at areas set aside for the long term research in order to improve our understanding of the dynamics and processes of estuarine systems.

2. Needed research:

- Design and achieve optimal biological monitoring, which may* involve sentinel species ("mussel watch"), juvenile fish and shellfish, harvests, plankton and other indicators.

- Develop and employ the potentials of remote sensing for* monitoring.

- Develop and refine monitoring protocol of point and non-point* (diffuse) sources of anthropogenically derived materials.

- Develop schedules and components of long-term chemical, physical* and biological studies of water exchange.

- Develop physical time-series information for fixed points* throughout the system.

- Define quantitatively the network of flows of energy, carbon,* nitrogen and phosphorous among the major components of the Chesapeake Bay ecosystem.

- Determine the exchanges of important chemical substances within* and between segments of the Bay system.

- Determine the interactions of sensitive life history stages of* important species with environmental factors.

- Determine the physical, chemical and biological responses in the* Bay system to pulses of high freshwater input.

- Determine the ecosystem-level stress responses of the Bay or of* segments in terms of breakdown in the capability of the system to integrate its inputs into coherent system-level outputs.

3. Applicability to the Sanctuary Program

- Watershed studies over the past ten years at the Rhode River Site provide a unique, long term record of water quality meteorological and land use data that permit identification of impact trends and inference of effects of land management practices.

- Population studies of reproduction success of semi-anadromous fish at the Rhode River, when linked with meteorological and water quality conditions, could lead to identification of critical needs for success of important species.

- Long term data records in water quality meteorology, land use at Rhode River can provide a much needed source of baseline data for comparable conditions.

- The multiple site system can provide a unique opportunity to monitor storm and post storm conditions in different zones of the Bay.

- Monitoring of mosquito control practices and environmental conditions at the Monie Bay offers an opportunity to observe the effects on aquatic life.

- Build upon existing research of watershed analysis and water quality effects at the Rhode River site and develop transferable management principals for comparable areas.

E. Preservation

1. Overview of management problems

The continued health of the Chesapeake Bay requires the setting aside of selected estuaries to minimize the influx of contaminants from developed areas. The extent of this need is not established, but further under-

standing can be gained by selecting sites representative of ecological zones of the Bay and setting them aside for future study. It is a central function of the program to identify representative sites and to protect them from significant impacts that would threaten their ecological systems. The Program provides a strategy for site selection and management to minimize impacts. Where sites remain undisturbed, then comparisons can be made. This comparison should permit the better evaluation of significance of impacts.

2. Needed Research

- Identify the set of estuarine areas around the Bay which would* best serve as reference areas for research and education and development of management approaches.

- Continued refinement of criteria used to select future estuarine* sanctuary sites.

- Define boundary requirements to meet protection and research needs.

- Analysis of the effects of selected management practices at sites on key sanctuary wildlife and aquatic life.

- Establish a consistent research program at all sites that would allow comparison of ecological systems and how they are significantly impacted.

3. Applicability to the Sanctuary Program

- The designation of two sites, one more brackish than the other, permits comparative analysis of distinct ecosystems.

- The relatively disturbed character of the two designated sites allows the identification of inflows from protected tributaries to the Bay with those of other areas.

- The program is working towards the designation of further representative sites.

APPENDIX C

From "Proposal: Long Term Ecological Research on the Rhode River Watershed/ Estuarine Ecosystem" submitted to the National Science Foundation by the Chesapeake Research Consortium, February, 1980.

General Hypotheses

Hypothesis 1: Increasing directional degradation of the environment (e.g., higher levels of atmospheric ozone, nitrogen oxides, sulfur dioxide, heavy metals, declining pH of precipitation; progressive destruction and fragmentation of natural habitats) is having measurable adverse effects on biological communities, even in areas that are not overtly disrupted. Impacts are most pronounced in relatively closed systems, which tend to accumulate toxins and to exhibit "island" effects generally.

Explanation: Precipitation data collected at the CBCES site show a 3-fold increase in the concentration of nitrate and a 10-fold increase in acidity over the past six years. Laboratory studies have demonstrated the adverse effects on plants of ozone and sulfur dioxide and atmospheric concentrations of these compounds are projected to increase dramatically in the coming decade. Concentrations of certain heavy metals, notably zinc and manganese, are unusually high in precipitation at CBCES. At the same time that these potentially harmful exogenous substances are increasing in concentration, the ability of natural systems to absorb and recover from potential stress of any kind is being reduced by accelerating habitat destruction and the fragmentation of remaining forest and other undisturbed habitat into discontinuous patches. There is growing evidence that island-biogeographic phenomena (e.g., high extinction rates, low immigration rates, reduced species richness, loss of specialized and/or uncommon species) already have come to dominate the composition of some elements of the fauna.

Hypothesis 2: Community diversity is a function of the level of environmental disturbance, such that maximum diversity is manifested in systems that are subject to an intermediate level of disturbance. Low disturbance levels reduce diversity as a consequence of increased competitive dominance by a few species. High disturbance levels result in very low diversity because only a few species can tolerate repeated, intense disruptions.

Explanation: This hypothesis has been advanced for a wide variety of terrestrial and aquatic communities and habitats, and in its most general form should apply to virtually any system. The crux of the problem is to identify relevant stress-disturbance factors, measure them on a biologically meaningful scale of time and intensity, and establish realistic cause-effect relationships.

Hypothesis 3: In developing communities, species richness, equitability, and biomass all tend to increase monotonically with time, whereas niche breadth and niche overlap decrease.

Explanation: Although many of these and related generalizations (see following hypothesis) arose from studies of terrestrial plant succession, logically they should apply also to other organisms, habitats, and time scales. There is growing doubt of the validity of these hypotheses, even for terrestrial plants, and we believe that critical empirical tests in a variety of systems are necessary before such generalizations are construed as ecological "laws". Moreover, even if the hypotheses hold in their most general form, we need to quantify the rates at which diversity and biomass accrete in various terrestrial and aquatic systems.

Hypothesis 4: Net productivity and efficiency of mineral retention first increase, then decline with community development following disturbance.

Explanation: As with the foregoing hypothesis, this view has been developed on the basis of "horizontal" plant successional studies of sites that are believed to represent different developmental stages of the same successional sequence. However, sites always differ in other ways as well, and we feel that a proper role for LTER is to test these and related hypotheses in long-term "vertical" studies of individual sites undergoing succession. Even if the hypotheses as stated cannot be falsified, we need to gather comparative data on actual levels of productivity and mineral retention in different systems, and to identify the stage of community development at which these properties are maximized.

Hypothesis 5: Density-independent physical factors are the most important determinants of community composition and population dynamics during early stages of community development. As community development proceeds, density-dependent factors, especially competition and predation, become increasingly prominent.

Explanation: This hypothesis is a logical consequence of the notions that mature communities are better buffered against environmental stress than are early communities and that individual populations are more likely to be regulated by density dependent factors in late successional communities, which are assumed to be more stable. The validity of these ideas has not been rigorously tested, either with empirical observations of natural communities over time, or with controlled manipulations of suspected biotic and abiotic factors. If this hypothesis is valid, experimental removal of predators, parasites or competitors should

have a more destabilizing effect in late successional communities and their component populations than in early successional communities, whereas variation of a physical stress factor should have greater effects on populations in early successional communities .

Hypothesis 6: During community development, one or more mineral nutrients will eventually become limiting for both productivity and species composition.

Explanation: The balance between mineral nutrient input rates (via precipitation and mineral soil weathering) and output rates (via leaching, volatilization) differs for each essential element. Elements for which this balance is negative will tend to become limiting with time. Species of autotrophs which are best adapted to compete for these limiting elements, or which require them in least amounts will be favored. Secondary effects, such as decreased fruit production or palatability of successful autotroph species, will impact on the populations of herbivorous species which depend on these food resources.

Appendix D

Smithsonian Institution

Office of the Assistant Secretary for Science

Chesapeake Bay Center for Environmental Studies

APPLICATION FOR PERMISSION TO USE FACILITIES OF THE CHESAPEAKE BAY CENTER FOR ENVIRONMENTAL STUDIES

General Instructions

1. The information herewith requested will be used to determine whether the facilities of the Chesapeake Bay Center for Environmental Studies will be available and whether other privileges may be obtained. Please answer all questions fully and accurately.

2. When your application is completed, please submit to:

Director
Chesapeake Bay Center for Environmental Studies
Route 4, Box 622
Edgewater, Maryland 21037

GENERAL CONDITIONS AND REGULATIONS FOR VISITORS TO

THE CHESAPEAKE BAY CENTER FOR ENVIRONMENTAL STUDIES

1. The Chesapeake Bay Center for Environmental Studies, a facility administered and operated by the Smithsonian Institution, was established for the advancement, through research and education, of ecological knowledge at all levels of biological integration, with emphasis on populations, communities, and ecosystems. Duly qualified individuals or groups who are pursuing specific studies or educational programs may be accommodated at the Center. The number of visitors is dictated primarily by the availability of facilities. The Smithsonian Institution reserves the right to offer or refuse any or all privileges at the Center. The purpose of these regulations is the prevention of conflicts between research projects.

2. Applicants will be furnished with rules regarding general use of the Center including submission of reports, collections of any kind, the trapping or marking of plants and/or animals, the use of fires, firearms, toxic chemicals, and bringing of pets to the area.

3. The Chesapeake Bay Center for Environmental Studies does not assume any legal responsibility for the health or welfare of visitors, their families, or assistants. There is no resident physician, but in case of emergencies the Chesapeake Bay Center for Environmental Studies personnel will render all possible aid to assist an ill or injured person to secure medical attention at the nearest clinic or hospital.

4. The Chesapeake Bay Center for Environmental Studies does not assume any responsibility for loss or theft of, or damage to, personal effects or research supplies or equipment brought to the Center.

5. The Smithsonian Institution reserves the right to amend these general conditions and regulations without prior notice to visitors, with the exception that no increase in fees charged will be levied following acceptance by the Smithsonian Institution of an application.

6. Application for scientific research projects must be renewed annually. (Jan. 1)

A copy of all data collected at the Chesapeake Bay Center must be filed annually in the Center's data bank. The Center also requests copies of all research reports and publications deriving from research carried out at the Center.

Format for Scientific Research Proposals at the

Chesapeake Bay Center for Environmental Studies

Please send two copies to the address below at least one month before you plan to begin your research.

1. Title of project.
2. Principal investigator, title, institutional affiliation.
3. Objectives.
4. Total number and names of personnel involved.
5. Period of study and schedule of activities.
6. Are there requirements for Center facilities and support? If yes, complete attached form.
7. Area intended for field studies including the need for buffer areas.
8. Methods of research, including:
   a. Treatment of organisms.
   b. Marking methods of study area.
   c. Collection of specimens.
   d. Introduction of organisms.
   e. Equipment to be left on site.
   f. Plans for use of radioisotopes, pesticides, or other toxic chemicals.
9. Signature and date.

Return to: The Director
Chesapeake Bay Center for
Environmental Studies
Route 4, Box 622
Edgewater, Maryland 21037

REQUEST FOR CBCES FACILITIES AND SUPPORT
(Please Note that facilities are limited and may be charged for. Answers should be in detail.)

1. Laboratory Space _____

_____

2. Office Space _____

_____

3. Living Facilities _____

_____

4. Equipment (Lab or Office) _____

_____

5. Utilities (Lab or Field) _____

_____

6. Special Waste Disposal Requirements _____

_____

7. Shop Support _____

_____

8. Use of Vehicles (Type and Frequency of Use) _____

_____

9. Use of Boats (Type and Frequency of Use) _____

_____

10. Docking Space for Boats _____

_____

11. Need for Access to the Center on Evenings, Weekends, and Holidays _____

_____

Research Project Monitoring & Recording For Estuarine Sanctuary Purposes

All researchers submit a completed research application at least two months in advance of the starting date to allow the review process to take place. This application shall include three copies of, "Application for Permission to use Facilities of CBCES", and a one page abstract. The Site Manager may require additional data in order to evaluate the proposal in terms of Sanctuary goals.

Applications for research grants are renewed at least annually. Renewal can be processed by written request to the Site Manager one month in advance.

The researcher shall provide the Sanctuary Manager and CBCES with one copy each of final and draft reports and any other publications resulting from the research. A copy of data collected should be filed annually with the Site Manager.

APPENDIX E

MEMORANDUM OF UNDERSTANDING

BETWEEN

THE STATE OF MARYLAND AND THE SMITHSONIAN INSTITUTION

CONCERNING THE

ESTABLISHMENT AND ADMINISTRATION

OF THE

CHESAPEAKE BAY ESTUARINE SANCTUARY AT RHODE RIVER

WHEREAS, the State of Maryland, acting through the Department of Natural Resources (DNR) has determined that the designation of a Chesapeake Bay Estuarine Sanctuary under the National Estuarine Sanctuary Program as provided for in the Coastal Zone Management Act of 1972, as amended (CZMA), would provide for beneficial long-term research and public education to improve the coastal management capabilities of the State, and

WHEREAS, the National Oceanic and Atmospheric Administration (NOAA), Office of Coastal Zone Management (OCZM) has conditionally approved a matching financial assistance award to DNR to establish the Chesapeake Bay Estuarine Sanctuary at two sites, Monie Bay in Somerset County, and the Muddy Creek portion of the Rhode River in Anne Arundel County; and

WHEREAS, the Smithsonian Institution owns property along the Rhode River site, known as the Chesapeake Bay Center for Environmental Studies (CBCES); and

WHEREAS, the Smithsonian Institution is willing to have a substantial portion of its property at CBCES, along with adjacent waters of the State of Maryland on Rhode River, designated for the purposes and in the manner set forth below as the "Chesapeake Bay Estuarine Sanctuary at Rhode River" (the Sanctuary at Rhode River); and

WHEREAS, the Smithsonian Institution also intends to donate to the State of Maryland a long-term property interest in a parcel of land within the CBCES on which an educational facility will be constructed which will become a major component of the Sanctuary at Rhode River;

WHEREAS, the DNR intends to have the educational facility constructed with the proceeds of the financial assistance award to the State from NOAA and further intends to permit the Smithsonian Institution to use the facility as part of the Sanctuary at Rhode River; and

WHEREAS, DNR, the Smithsonian Institution and NOAA recognize that the designation of the Sanctuary at Rhode River is an acknowledgement that the area within the Sanctuary is a natural field laboratory, to be used to study and gather data on natural and human processes occurring within the upper Chesapeake Bay estuary, and further to provide a basis for increased public awareness and understanding of the complex nature of estuarine systems, their values and benefits to man and nature, and the problems that confront them, and

WHEREAS, the disbursement of the federal grant is conditioned upon the execution of this Memorandum of Understanding between the DNR and the Smithsonian Institution:

NOW, THEREFORE, for and in consideration of the mutual covenants herein contained it is agreed by and between the parties as follows:

ARTICLE I - Uses of the Sanctuary at Rhode River

The Chesapeake Estuarine Sanctuary at Rhode River will be used primarily for environmental research and public education. The research will be directed towards: (1) a better understanding of the ecological relationship within the estuarine environment; (2) baseline ecological measurements; (3) monitoring significant changes in the estuarine environment; and (4) as assessment and prediction of the effects of man's activities on the estuarine environment. The educational programs will be designed to increase public knowledge and awareness of estuarine systems, and will serve as models for similar programs to be implemented throughout the Bay area and in other estuarine systems. Even though environmental research and education are the primary activities to be conducted within the Sanctuary, the Sanctuary's designation is not intended to restrict commercial fishing and water-oriented recreation activities (e.g. water skiing) which have been traditionally conducted in Rhode River, nor to contravene the manner in which these activities are regulated by appropriate law.

ARTICLE II - Sanctuary Boundary

The Chesapeake Bay Estuarine Sanctuary at Rhode River will include the land presently owned by the Smithsonian Institution at its Chesapeake Bay Center for Environmental Studies, with the following specific exclusions: the Southern half of Ivy Neck, the "Henry Murray" parcel, the Stevens Farm, "Francis Field", the "Chicken Farm" and Big Island. The Sanctuary boundary will also include a substantial portion of the Muddy Creek tributary up to Old Muddy Creek Road, which shall serve as the upstream boundary. The downstream boundaries will lie along a line from Fox Point to the western shore of Boathouse Creek. The boundaries are designated on the map which is appended to this Memorandum, Appendix A.

ARTICLE III - Title and Use of CBCES Property

Except as specifically provided below in regard to: (1) DNR's leasehold interest in the 15 acre parcel; and, (2) the Sanctuary educational building and equipment, all of which shall be known as the Rhode River Sanctuary Educational Complex and referred to as the "Sanctuary Educational Complex", the real and personal property within the boundaries of the CBCES shall continue to be owned exclusively by the Smithsonian Institution. The use of such property within the boundaries of the Sanctuary but outside the Sanctuary Educational Complex shall be consistent with the purposes for which the Sanctuary is established. Future land acquisitions made by the Smithsonian Institution for the CBCES will not be added to the Sanctuary at Rhode River unless specifically requested by the Smithsonian and approved by the Secretary of the DNR and the Assistant Administrator for Coastal Zone Management, NOAA.

Sanctuary designation and execution of this Memorandum of Understanding between the Smithsonian Institution and the State of Maryland is intended to acknowledge the right of the State to carry out educational and research activities in the Sanctuary as a whole according to the purposes for which the Sanctuary is established, and is also to acknowledge that the Smithsonian Institution is committed to long-term use of the CBCES as a preserve for environmental research and education. Under this agreement, the Smithsonian will continue its activities and programs, and sanctuary designation will not replace existing or prohibit future programs of the CBCES which are carried out pursuant to the mandates of the Smithsonian Institution and

the goals the Smithsonian has specified for the CBCES. The Smithsonian Institution will retain control over its program and activities involving the CBCES, and its lands and facilities not included within the Sanctuary Complex. However, such programs and activities shall be conducted in a manner consistent with the purposes for which the Sanctuary is established as described in the management plan. In addition, the CBCES, its lands and facilities will continue to be funded, operated and administered by the Smithsonian Institution and, with the permission of the Director of the CBCES, may be available for specific programs of the Sanctuary at Rhode River. The parties agree to coordinate their programs and activities conducted within the Sanctuary at Rhode River to the maximum extent practicable. Disputes concerning such activities and programs shall be resolved according to the procedures established by Article X.

ARTICLE IV - Sanctuary Facilities

A facility to support Sanctuary-related education programs and other educational activities of CBCES will be constructed near the existing CBCES dock on Rhode River, on the 15 acre parcel to be leased to the State of Maryland. The building is intended primarily for public education purposes and will be used jointly by the Smithsonian Institution and the State of Maryland, in accordance with the procedure established below.

The Smithsonian Institution will grant at no cost to the State a leasehold interest in 15 acres of its property, for an initial period of 50 years, renewable at the State's option for successive periods of 10 years or less, to serve as the building site and adjacent parking area, collectively to be known as the Rhode River Sanctuary Education Complex, as provided for in clause A below:

A. Not later than three (3) months following the date of execution of this Memorandum of Understanding, the Smithsonian Institution shall execute a lease granting to the State of Maryland, Department of Natural Resources, a leasehold interest in the 15 acre parcel, the description and plat of which are attached as Appendix B. The terms of the lease shall provide that the parcel shall be the site of an educational facility and adjacent parking area to be constructed with funds awarded to the State of Maryland by NOAA.

The lease shall acknowledge that title to the building shall vest in the State of Maryland, and that the Smithsonian Institution shall enjoy the use of the facility, on a shared basis with the State, in a manner consistent with the purposes for which the Sanctuary at Rhode River is established;

B. In accordance with the schedule imposed by the NOAA financial assistance award to DNR, there shall be completed on the leasehold parcel, not later than September 29, 1984, the education building, and any related structures to facilitate visitor use, such as, for example, marsh boardwalks and boat launching ramps. The design, requirements, and construction time schedule for these facilities shall be governed by the "Procedures for Construction of the Rhode River Sanctuary Education Complex", which document the parties will prepare not later than three (3) months following execution of this Memorandum of Understanding. This document shall be consistent with the provisions of this Memorandum of Understanding, and is subject to approval by NOAA; and

C. The Smithsonian Institution agrees to execute any right-of-way agreements and easements reasonably necessary to permit construction of the facility. The Smithsonian Institution further agrees to execute any easements, conditioned to run for the term coinciding with the term of the Sanctuary designation, reasonably necessary for the State, and its employees, and visitors to the Sanctuary to gain access to the Sanctuary, its building, and facilities in accordance with the provisions of the Sanctuary Management Plan.

ARTICLE V - NOAA's Conditions of Financial Assistance

A copy of the financial assistance award No. NA-81-AA-D-CZ144, from NOAA to the State of Maryland, pursuant to the CZMA, is appended hereto as Appendix C and fully incorporated herein by reference. The Smithsonian Institution is aware of the conditions and requirements placed on the State of Maryland thereunder. The Smithsonian Institution agrees to cooperate in all respects with the State of Maryland in complying with the terms and conditions of the award. In particular, the Smithsonian agrees to cooperate with the State in meeting any audit, or accounting requirements, and any federal requirements concerning the placement of signs on the project indicating sanctuary designation.

ARTICLE VI - Operation and Maintenance of the Sanctuary Complex

The State of Maryland and the Smithsonian Institution will share equally in the annual costs of operating and maintaining the facilities and grounds of the Sanctuary Educational Complex which shall be governed by the "Procedures for Operation and Maintenance of the Rhode River Sanctuary Educational Complex", which document the parties will prepare not later than six (6) months following execution of this Memorandum of Understanding. This document is subject to approval by NOAA before it becomes effective.

The parties shall prepare an annual operating budget which shall be completed not later than July 1 of each year for which funds are proposed to be expended. For purposes of this Article, a "fiscal year" is defined as commencing on July 1.

In addition, the parties intend that the Sanctuary Complex may receive funding from sources other than federal and state contributions, i.e., private donations, corporate gifts, or research grants from industry.

ARTICLE VII - Uses of Sanctuary Complex

Use of the Sanctuary Complex will be shared by the State of Maryland and the Smithsonian Institution. Specific programs and activities at the Sanctuary Complex will be determined by the DNR Sanctuary Manager, in consultation with the Director, CBCES. Visitor use of the Sanctuary at Rhode River and the Sanctuary Complex will be determined jointly by the parties.

ARTICLE VIII - Administration of the Sanctuary

The Sanctuary Manager will be appointed by the Secretary, DNR. Sanctuary activities are hereby defined as limited to public education programs at the Sanctuary Educational Complex, joint research programs by the Smithsonian Institution and agencies or institutions of the State of Maryland, and other cooperative projects between these two entities and other academic institutions or other organizations which are designed specifically to address sanctuary goals.

The Sanctuary Manager, in coordination with the Director of the Chesapeake Bay Center for Environmental Studies, will be responsible for the following:

1. Directing research and educational activities at the Sanctuary on behalf of the State.
2. Coordinating activities at the Sanctuary to see that activities are carried out according to the Estuarine Sanctuary Management Plan, developed for the State as well as for the Sanctuary at the Rhode River;
3. On behalf of the State, coordinating activities with members of the Estuarine Sanctuary Management Committee, Site Selection Committee, and Site Advisory Committee (SAC) as set forth in the Management Plan;
4. Representing the Estuarine Sanctuary Management Committee at public meetings;
5. Advising and coordinating with universities and units of government, both within the DNR and other state and federal agencies, on particular issues, questions, and projects that affect the Sanctuary, at their request;
6. Seeking and coordinating special studies and research activities within or related to the Sanctuary, and its Sanctuary Management Plan and interpreting and applying research results to produce benefits to the Maryland Coastal Zone Management Program;
7. Developing and giving general oversight to an educational program for the Sanctuary;
8. Coordinating research efforts with the University of Maryland Sea Grant Program, Chesapeake Research Consortium, State of Virginia and local governments and other university programs; and
9. Managing the Sanctuary, including preparation of required State and Federal grant applications, proposals, budgets and reports, and maintaining records.

ARTICLE IX - Site Advisory Committee for the Rhode River

In addition to the Sanctuary Manager, a committee will be established to advise in the management of the Sanctuary.

This Committee called the SAC for the Rhode River will play an important role in insuring that local concerns are given adequate attention in managing the Sanctuary at Rhode River. The Site Advisory Committee for the Sanctuary at Rhode River will be composed of members from the local community representing adjacent property owners and user groups such as fishing, boating and hunting. These members will be appointed and can be reappointed or replaced for one year terms by the Sanctuary Manager in consultation with the Director, CBCES. Responsibilities of the Site Advisory Committee include:

1. Evaluating whether local development or land water uses may threaten environmental quality in the Sanctuary at Rhode River;
2. Determining whether local problems are arising due to the educational or research programs;
3. Assisting in the site research and education projects on a voluntary basis;
4. Advising DNR in the resolution of user conflicts at the site when possible; and
5. Discussing its concerns at meetings with the Sanctuary Manager so the DNR and the CBCES can further pursue any Sanctuary issues with local residents at an early stage.

ARTICLE X - Dispute Resolution

In the event of a dispute between Maryland and the Smithsonian Institution concerning the management, uses, or operation of the Sanctuary, the Under Secretary of the Smithsonian Institution and the Director of the Tidewater Administration shall resolve the dispute in a manner consistent with the purposes for which the sanctuary is established. If such dispute cannot be resolved by the Under Secretary and the Director, the dispute shall be referred to the Secretary, DNR, and the Secretary of the Smithsonian Institution for resolution. The parties agree to consult with NOAA at each state of the dispute resolution process and if necessary to refer any dispute to a third person chosen by both parties, who shall assist in resolving the dispute.

ARTICLE XI - Termination of the Sanctuary

At the conclusion of the 50-year leasehold interest granted to the State by the Smithsonian Institution in the 15 acre parcel, the State may renew its lease for additional successive periods of 10 years or less at no cost to the State. If the State and the Smithsonian Institution cease to operate the Sanctuary at Rhode River as a designated sanctuary, or sanctuary designation is withdrawn or otherwise terminated, the State's lease hold interest shall be terminated and the Smithsonian Institution shall again have the full and exclusive control and use of the property.

A. For purposes of this Article, and for reasons other than that stated in Clause B below, the parties agree that a decision to terminate the Sanctuary at Rhode River before the expiration of the lease shall be made jointly by the parties.

B. Failure of either party to provide its share of the funds specified in the annual operating budget for the Sanctuary Complex shall constitute grounds for the other party, at its option, to terminate the Sanctuary at Rhode River subject to the terms of this paragraph. The parties recognize that if the federal grant funds cease to be available, the State's share will become contingent upon action of the Maryland General Assembly, and that the Smithsonian share is subject to availability of funds. If DNR is unable because of legislative action to provide its share of the costs for operation and maintenance of the Complex in any fiscal year, the parties agree that DNR will have a 2 year grace period in which to provide any funding past due; provided, however, that if the State is unable to provide its share of the costs of operation for a successive three year period, the Smithsonian Institution may exercise its option to terminate the Sanctuary designation and the State's leasehold interest.

C. At the expiration of the 50-year lease or successive lease periods of 10 years or less, or if the Sanctuary designation is terminated, the State of Maryland shall convey its fee simple interest in the Complex building and appurtenances to the Smithsonian Institution; provided, however, that the Smithsonian's rights hereunder are subject to the reverter provision contained in the NOAA financial assistance award, as required by federal law. The federal reverter clause provides that when property acquired with federal

funds ceases to be used for designated sanctuary purposes, DNR is required to transfer title to the Federal Government, or alternatively, NOAA may permit DNR to retain title after DNR compensates the Federal Government in an amount computed by applying the Federal percentage of participation in the total cost of the original project to the fair market value of the property.

The Smithsonian Institution agrees, however, that, before it may acquire the State's interest in the Sanctuary Complex under this Article, and to the extent demanded by the Federal Government, it will compensate the State in the amount required by the above grant condition to satisfy any legal demand made upon the State by the Federal Government. Thereafter, neither the State of Maryland, the National Oceanic and Atmospheric Administration, nor any other agency of the State or Federal Government shall have any residuary claims upon the Smithsonian Institution, its lands, or facilities, as a result of prior designation of the Chesapeake Bay Center for Environmental Studies as an Estuarine Sanctuary.

IN WITNESS WHEREOF, the parties hereto have cause this Memorandum of Understanding to be executed this date, _____, 1982.

Witness	Secretary Smithsonian Institution
Witness	James B. Coulter Secretary

AVIAN AND MAMMALIAN SPECIES FOUND ON DEAL ISLAND WILDLIFE MANAGEMENT AREA, 1977

SPECIES		COMPARTMENT		
COMMON NAME	SCIENTIFIC NAME	I	II	III
AVIAN				
Bobwhite quail	Colinus virginianus			X
Bufflehead	Bucephala albeola	X		
Canvasback	Aythya valisineria	X		
Coot, American	Fulica americana	X	X	
Dove, Mourning	Zenaidura macroura			X
Duck, Black	Anas rubripes	X	X	X
Duck, Ring-necked	Aythya collaris	X		
Duck, Ruddy	Oxyura jamaicensis	X		
Duck, Wood	Aix sponsa	X		X
Gadwall	Anas strepera	X		X
Gallinule, Common	Gallinula chloropus	X	X	
Goldeneye, Common	Bucephala clangula	X		
Goose, Canada	Branta canadensis	X		
Goose, Snow	Chen hyperborea	X		
Mallard	Anas platyrhynchos	X		X
Merganser, Common	Mergus merganser	X		
Merganser, Hooded	Lophodytes, cucullatus	X		
Merganser, Red-Breasted	Mergus serrator	X		
Old Squaw	Clangual hyemalis	X		
Pintail	Anas acuta	X	X	X
Rail, Clapper	Rallus longirostris	X	X	X
Rail, King	Rallus elegans	X		X
Rail, Sora	Porzana carolina	X		X
Rail, Virginia	Rallus limicola	X		X
Redhead	Aythya americana	X		
Scaup, Greater	Aythya marila	X		
Scaup, Lesser	Aythya affinis	X		
Scoter, Common (black)	Oidemia nigra	X		
Scoter, Surf	Melanitta perspicillata	X		
Scoter, White Winged	Melanitta deglandi	X		
Shoveler	Spatula clypeata	X		
Snipe, Wilson's	Capella gallinago	X	X	X
Swan, Whistling	Olor columbianus	X		
Teal, Blue-Winged	Anas discors	X		X
Teal, Green-Winged	Anas carolinensis	X		
Widgeon, American	Mareca americana	X		
Woodcock, American	Philonela minor			X

APPENDIX F

AVIAN AND MAMMALIAN SPECIES FOUND ON DEAL ISLAND WILDLIFE MANAGEMENT AREA, 1977 (CONT.)

SPECIES		COMPARTMENT		
COMMON NAME	SCIENTIFIC NAME	I	II	III
AVIAN				
Bittern, American	Botaurus lentiginosus	X	X	
Bittern, Least	Ixobrychus exilis	X		
Blackbird, Red-Winged	Agelaius phoeniceus	X	X	X
Cormorant, Double-Crested	Phalacrocorax auritus	X		
Crow, Common	Corvus brachyrhynchos	X		X
Crow, Fish	Corvus ossifragus	X	X	X
Dunlin	Erolia alpina	X		X
Eagle, Bald	Haliaeetus leucocephalus	X	X	
Egret, Common	Casmerodius albus	X		
Egret, Snowy	Leucophoyx thula	X		
Egret, Cattle	Bubulcus ibis			X
Grackle, Boat-Tailed	Cassidix mexicanus	X	X	X
Grackle, Common	Quiscalus quiscula			X
Grebe, Horned	Colymbus auritus	X		
Grebe, Pied-billed	Podilymbus podiceps	X	X	
Gull, Herring	Larus argentatus	X	X	X
Gull, Greater Black-Backed	Larus marinus	X	X	
Gull, Ring-Billed	Larus delawarensis	X		
Gull, Laughing	Larus atricilla	X		X
Hawk, Marsh	Circus cyaneus	X		X
Hawk, Red-Tailed	Buteo jamaicensis			X
Hawk, Red-Shouldered	Buteo lineatus			X
Hawk, Rough-Legged	Buteo lagopus	X		X
Heron, Great Blue	Ardea herodias	X	X	X
Heron, Louisiana	Hydranassa tricolor	X		X
Heron, Little Blue	Florida caerulea	X	X	
Heron, Green	Butorides virescens	X		X
Heron, Black-Crowned Night	Nycticorax nycticorax	X		
Ibis, Glossy	Plegadis falcinellus	X		
Kingfisher, Belted	Megaceryle alcyon			X
Meadowlark, Eastern	Sturnella magna	X		X
Osprey	Pandion haliaetus	X	X	
Owl, Great Horned	Bubo virginianus	X		X
Sparrow, Tree-Tailed	Amiospiza caudacuta	X	X	X
Sparrow, Seaside	Ammospiza maritima	X		X

AVIAN AND MAMMALIAN SPECIES FOUND ON DEAL ISLAND WILDLIFE MANAGEMENT AREA, 1977 (Cont.)

SPECIES		COMPARTMENT		
COMMON NAME	SCIENTIFIC NAME	I	II	III
AVIAN				
Sparrow, Song	Melospiza melodia	X		X
Starling	Sturnus vulgaris	X		X
Tern, Common	Sterna hirundo	X	X	
Tern, Forster's	Sterna forsteri	X	X	
Tern, Least	Sterna albifrons	X	X	
Vulture, Turkey	Cathartc aura	X	X	X
Willet	Catoptrophorus semipalmatus	X		X
Wren, Long-Billed	Telmatodytes palustris	X	X	
Wren, Short-Billed	Cistothorus platensis	X	X	
Yellowlegs, Lesser	Totanus flavipes	X		
Yellowlegs, Greater	Totanus melanoleucus	X		
MAMMALIAN				
Cottontail, Eastern	Sylvilagus floridanus			X
Deer, White-Tailed	Odocoileus virginianus	X		X
Fox, Gray	Urocyan cinereoargenteus			X
Fox, Red	Vulpes fulva	X	X	X
Mink	Mustela vison	X	X	X
Muskrat	Ondatra zibethica	X		
Nutria	Myoc[illegible]or coypus	X		
Opossum	Didelphis virginianus	X		X
Otter, River	Lutra canadensis	X	X	
Raccoon	Procyon lotor	X	X	X
Squirrel, Gray	Sciurus carolinensis			X
Vole, Meadow	Microtus pennsylvanicus	X		X

Appendix G

VEGETATIVE COVER, MONIE BAY SITE UPLAND AREA*

Layer	Vegetation	DBH (cm.)	Cover (%)				
			Site 1	Site 2	Site 3	Site 4	Site
Canopy	Loblolly pine (Pinus taeda)	8-53	76	62	72	41	79
	Sweet gum (Liquidambar styraciflua)	8-38	17	23	17	11	3
	American holly (Ilex opaca)	8-23	2	7	0	36	13
	Black gum (Nyssa sylvatica)	8-15	3	4	7	2	0
	Misc. (oaks, cherry, red maple)	8-38	3	3	3	9	5
Understory	Sweet gum	3-8	21	33	8	30	23
	Poison ivy (Rhus radicans)	3-8	4	0	50	0	0
	Black gum	3-8	13	17	21	3	0
	American holly	3-8	8	19	4	42	21
	Loblolly pine	3-8	33	0	4	18	28
	Wax-Myrtle	3-8	13	10	4	3	18
	Red maple (Acer rubrum)	3-8	0	14	0	0	5
	Highbush blueberry	3-8	0	7	0	3	0
	Oaks (willow, swamp white)	3-8	8	0	0	1	2
	Misc. (red cedar, dwarf sumac, shadbush)	3-8	0	0	8	0	3
Dominant shrubs	Wax-Myrtle		✓	✓	✓	✓	✓
	Blueberries		✓	✓		✓	
	American holly		✓	✓		✓	✓
	Poison ivy		✓	✓	✓		✓
	Common greenbrier (S. rotundifolia)				✓	✓	✓
	Sweet gum		✓			✓	✓
	Black gum				✓		
	Black cherry (Prunus serotina)				✓		
Dominant ground cover (life form)	Litter		✓	✓	✓	✓	✓
	Ferns		✓	✓	✓	✓	
	Shrubs		✓	✓	✓	✓	✓
	Seedlings			✓	✓	✓	✓
	Grass		✓	✓		✓	✓
	Forbs						✓
	Slash		✓				
Mean canopy height (meters)			17	18	26	18	19
Percent canopy cover			70	65	90	90	80
Percent ground cover			25	15	5	5	15

*Based on 5 one-tenth acre samples on or within one-half mile of Monie Bay Sanctuary, 1982.

Location: Site 1 38°11'25"N, 75°50'45"W
2 38°11'25"N, 75°50'37"W
3 38°11'28"N, 75°49'23"W
4 38°13'58"N, 75°47'59"W
5 38°14'30"N, 75°48'04"W

Source: Chandler Robbins, U.S. Fish & Wildlife Service, 1982.

Appendix H
Maryland Wildlife
Administration
Sample

Project No. _____

Page 1 of _____

PROJECT PROPOSAL FORM

REGION: Statewide DISTRICT: _____ LOCATION: _____

PROJECT TITLE: Furbearer Scent Station Survey

NEW PROJECT: _____ CURRENT PROJECT W-53-R ALTERNATIVE _____

NAME OF RESOURCE OBJECTIVE MOST AFFECTED: Red fox, grey fox, raccoon and bobcat

SUBMITTED BY: Stephen A. Miller FACTOR CODE: _____

Name (s)

10/31/82

Date

COMMENTS/CONCURRENCE

DISTRICT MANAGER:

REGIONAL MANAGER:

COMMITTEE CHAIRMEN:

DIVISION CHIEF:

PLANNER:

NARRATIVE DESCRIPTION AND JUSTIFICATION OF PROJECT

Narrative Description and Justification of Projects: (Relate justifications to goals, objectives, problems and strategies of affected programs as specified in Strategic Plan).

OBJECTIVE/PROBLEM: ACM Natural Resources Article Section 10-205(a) authorizes the Secretary to adopt rules and regulations affecting wildlife with due regard given to the distribution, abundance, economic values, and breeding habits of wildlife. Information is needed regarding the distribution and abundance of red fox, grey fox, raccoon, and bobcat populations in Maryland to provide a basis for either recommending or reviewing changes in rules and regulations which affect those species. This information is also required for developing measurable strategic objectives for each of these species.

There is a need for statewide operational field techniques that provide indices to upland furbearer populations on an annual basis. This technique should augment the existing fur dealer reporting system and offset the problems inherent in the harvest data provided by that source.

CONTINUED ON ATTACHED PAGE

PROCEDURE/ACTIVITIES: A total of 150 survey routes employing the scent station concept will be conducted annually in October. Transects are randomly selected on lightly traveled roads through typical habitat. Each transect is 1.8 miles long and includes ten scent stations at .2 mile intervals. A scent station consists of a three foot circle of sifted soil with a scent capsule installed in the center. Transects will be surveyed for three days following installation and information collected pertaining to operability as well as visitations by species. The Program Manager will supervise and assist field personnel in conducting surveys statewide. Data collection will include date, weather, survey type, visitation by species, habitat description. Survey data will be collated by Regional Biologists, grouped by county and physiographic regions and submitted to Program Manager for analysis. The data will be interpreted on an annual basis as visitations by species, tracks/survey, # tracks/mile, etc. The assumption is that annual scent station visitation

CONTINUED ON ATTACHED PAGE

CONSEQUENCES:

Recommended changes in statutes affecting these species could only be objectively made or reviewed on the basis of historical records of their distribution and abundance in Maryland.

LOCAL PRIORITIES:

N/A

OBJECTIVE/PROBLEM CONTINUED

Pelt values for red fox, grey fox and raccoon have risen dramatically in recent years providing a significant incentive for a corresponding increase in trapping pressure. Although existing fur dealer and shipping tag reporting procedures provide excellent detailed harvest information, the value of the pelt records as an index to furbearer population trends is weakened by the absence of refined "catch-per-unit-of-effort" data. Supplemental information from annual statewide field surveys is necessary and will provide an important method of monitoring populations of several popular and economically valuable trap target species such as red fox, grey fox and raccoon. In addition, survey techniques will provide data on bobcat populations which appear to be widely dispersed although possibly recovering from very low levels. Specific distribution and status information is required on the bobcat on a statewide basis before intelligent decisions can be made on managing the species which is completely protected but no longer included on the state endangered list until such time that the species status is more clearly defined.

State wildlife agencies have traditionally monitored furbearer populations by analyzing harvest data provided by fur dealers or trappers and pelt tagging records. Some agencies supplement their data by obtaining sex, age and reproductive information through examining a sample of trapper or hunter-killed carcasses either on a routine or special basis. Field census techniques for monitoring non-aquatic furbearer populations have not been widely used in the past but operational methods are now evolving rapidly. The noted developments employ scent post techniques and have been applied to coyote populations on a massive annual survey effort over the entire western half of the United States since 1972 (Linhart and Knowlton 1975). In addition, extensive statewide programs to monitor furbearer populations through field surveys have been very recently implemented by wildlife agencies in Florida (Brady, 1979), Georgia (Hon, 1979), Louisiana, Maine, North Carolina and Virginia (Coggin, 1979). Some projects are being oriented specifically to bobcat, others have a more general mission involving many carnivore species. With the exception of Maine's midwinter snow track counts (Hunt, 1979) the aforementioned states have modified the Linhart-Knowlton scent station technique and conduct the surveys during the month of October. Most agencies have rejected alternate proposals involving scat count routes or track count transects in view of the difficulty associated with separating species (in the case of scat counts) or because of unreliable tracking conditions.

A pilot effort involving 143 Scent Station Transects was refined and successfully conducted on a statewide basis in Maryland during October, 1980. The project design is a duplication of efforts being conducted by other state agencies. Data collection was oriented to grey fox, red fox, raccoon and bobcat. rates and winter track counts will parallel trends in fox, raccoon and bobcat populations. The project design and sampling procedure has been subjected to review by Dr. Don W. Hayne and Dr. Kenneth Pollock, statisticians at the University of North Carolina who will also participate in processing and analysis of data.

WORK UNIT EVALUATION

ESTIMATED LABOR REQUIRED: Estimate all significant manpower requirements by mandays.

LABOR TYPE	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
			(MANDAYS)		
AGENCY ADMINISTRATION					
SECRETARIAL ASSISTANCE					
MIDDLE MANAGEMENT					
Natural Resources Manager III	5	5	5	5	5
BIOLOGISTS					
* Natural Resources Biologist IV	10	10	10	10	10

* 1 MD/District

WORK UNIT EVALUATION (continued)

ESTIMATED LABOR REQUIRED: Estimate all significant manpower requirement by mandays

LABOR TYPE	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
			(MANDAYS)		
TECH/AIDS					
* Wildlife Technician III	150	150	150	150	150
ENFORCEMENT					
PART-TIME ASSISTANCE					
OTHER DEPT. AGENCY PERSONNEL					

* W-1: 20 MD
W-2: 15 MD
W-3: 20 MD

C-1: 15 MD
C-2: 15 MD

S-1: 10 MD
S-2: 15 MD
S-3: 10 MD

E-1: 15 MD
E-2: 15 MD

COST WORKSHEET FORM

Estimate all costs of this work. Round your estimate to the next higher hundred dollars.

EXPENSES CATEGORIES*	COST IN $100 YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5
Salaries (.01)	10800	10800	10800	10800	10800
Additional assistnace					
Overtime					
Technical & Special fees (.02)					
Communications (.03)					
Travel (.04)					
Food (.05)					
Fuel & Utilities (.06)					
Motor Vehicle Maint. & Operation (.07)					
Contractual Services (.08)					
Supplies & Materials (.09)					
Equipment - Replacement (.10)					
Equipment- Additional(.11)					
Grants, Subsidies & Contributions (.12)					
Fixed Charges (.13)					
Land & Structures (.14)					
TOTAL PROJECT COST					

* Please refer to Budget Classifications - Items of Expenditure for a more complete listing of included expenditures.

PROJECT EVALUATION FORM

OUTPUT EVALUATION: USE A SEPARATE OUTPUT FORM FOR EACH RESOURCE OBJECTIVE AFFECTED BY THIS PROJECT.

RESOURCE OBJECTIVE AFFECTS? red fox, grey fox, raccoon & bobcat FACTOR CODE _____

IF THE PROJECT WAS INITIATED DURING THE NEXT FISCAL YEAR, HOW MANY YEARS WOULD ELAPSE BEFORE PRODUCTION OF THIS OUTPUT PEAKED? N/A

LENGTH OF EFFECT OF PROJECT N/A OUTPUT UNITS N/A

PROVIDE ESTIMATES FOR THE EFFECT OF THIS PROJECT ON PEAK YEAR PRODUCTION.

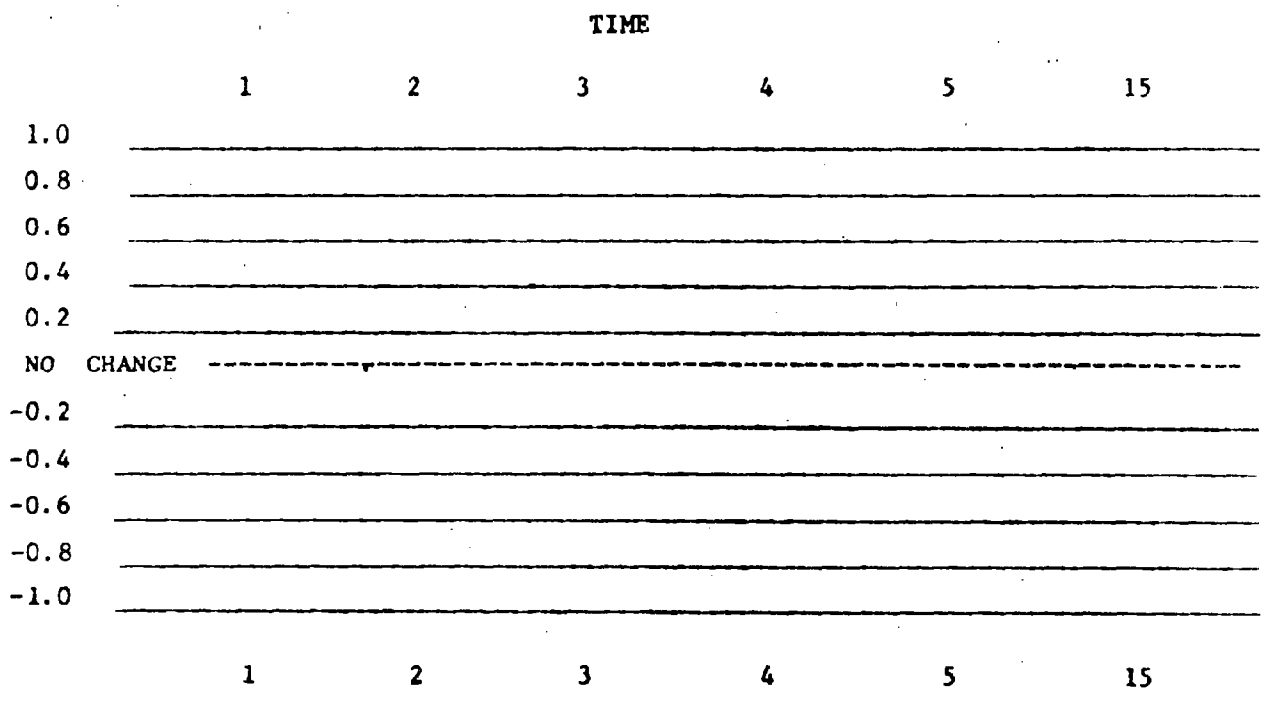
MINIMUM PEAK YEAR PRODUCTION N/A

MOST LIKELY PEAK YEAR PRODUCTION _____

MAXIMUM PEAK YEAR PRODUCTION _____

GRAPH THE EFFECT OF THIS PROJECT ON PRODUCTION OVER TIME. REPRESENT THE PEAK YEAR AS 1.0 IF THE PROJECT INCREASES PRODUCTION: -1.0 IF THE PROJECT DECREASES PRODUCTION. ESTIMATE THE EFFECT OF THE PROJECT ON PROGRAM OUTPUTS OF YEAR 1, (FIRST FUNDING YEAR) YEAR 2, 3, 4, 5, and YEAR 15.

REFERENCE ALL YEARS TO PRODUCTION IN THE PEAK YEAR.



APPENDIX I

MODEL HABITAT GUIDELINES

FOR

DABBLING DUCKS

(BRACKISH MARSH CONDITIONS)

AT

DEAL ISLAND WILDLIFE MANAGEMENT AREA

CONTENTS

I. WATER REQUIREMENT

A. General
B. Breeding
C. Nesting
D. Brood

II. FOOD REQUIREMENTS

A. General
B. High Value Category Definition
C. 1. - 4. Species and parts utilized
Acceptable Value Category Definition
1. - 4. Species and parts utilized
D. Invertebrate Relationship

III. COVER REQUIREMENTS

A. General
B. Breeding
C. Nesting
D. Brood

I. Water Requirement - as it relates to puddle duck physiological and ecological (non-specific) needs.

A. General - A given hectare of habitat should contain a minimum of 2,754 sq. meters of water in one or many locations.

1. Where daily tidal inundation occurs, less than 2,754 sq. m./ha. of water is acceptable.

2. Where permanent water exists within 50 m. of the habitat boundary, less than 2,754 sq. m./ha. of water is acceptable.

B. Breeding - The relative water - vegetation proportions given above apply to breeding habitat. Salinity of 20.0 ppt. should be considered maximum.

C. Nesting - The guidelines listed in A. above apply to nesting habitat.

D. Brood - Permanent water over 12.7 cm. in depth should be an integral part of brood habitat. Tidal inundation is desirable, however the permanent water should not be dependent on tidal replacement to maintain the required depth.

II. Food Requirements

A. General

113.4 g. (dry wt.) food/day for medium and small ducks

226.3 g. (dry wt.) food/day for large ducks.

B. High value - those which, when fed alone produce the above energy equivalent.

1. Dwarf spikerush - Eleocharis parvula	leaves
2. Widgeongrass - Ruppia martina	stems
3. Sago Pondweed - Potamogeton pectinatus	roots
4. Saltmarsh bulrush - Scirpus robustus	seeds

C. Acceptable value - those which when fed alone do not produce the above energy equivalents; except when fed with high value foods in proportionate volumes.

1. Eelgrass - Zostera marina - leaves, roots, seeds
2. Muskgrass - Chara spp. - primarily oogonia, roots
3. Three-square - Scirpus olneyi - seeds
4. Saltmarsh cordgrass - Spartina alterniflora - seeds rootstalks

D. Invertebrate relationship - High protein invertebrates have not been included because their presence has the potential for raising an "acceptable" plant to the "high" category. Their presence in the diets of nesting females (for egg laying), and molt (for both sexes); and broods, is essential.

III. Cover Requirements

A. General - Fifty percent of a given habitat should be open water. Artificial or natural loafing sites should be present, ideally 2 or more per hectare.

B. Beeding - Loafing sites for males should exist such that the paired males in the breeding population are accommodated. A density of 2 sites/hectare is suggested.

C. Nesting - Nesting cover (to include trees, shrubs and herbs) should be within 50 m. of permanent water. Emergent vegetation should be high enough to cover the rest yet not be so dense as to shade out the ground layer.

D. Brood - Fifty percent of a given habitat should be open water greater than 12.7 cm. deep. Emergent vegetation should rise 45.7 cm. or more above the water or ground level. Overall size should not be less than 0.5 hectare. Natural or artificial small loafing sites should occur at 2 or more per hectare.

APPENDIX J

MODEL HABITAT GUIDELINES

FOR

BOBWHITE QUAIL

at

DEAL ISLAND WILDLIFE MANAGEMENT AREA

CONTENTS

I. COVER REQUIREMENT

A. General
B. Nesting
C. Escape Cover

II. FOOD REQUIREMENTS

A. General
B. Woody Plants
C. Woodland

III. WATER REQUIREMENTS

A. General

I. COVER REQUIREMENTS

A. General - the Bobwhite quail is Maryland's most sought game bird. Maximum numbers usually occur in well managed areas and where field abandonment has resulted in grassy, weedy, and brushy overgrowth - before woodland stages of plant succession predominate.

Quail range up to about ¼ mile daily with an average annual cruising range between ¼ to ½ mile. A covey's range can vary from 160 acres down to 10 or 16 acres, depending on the distribution and availability of food and cover.

Cover requirements of quail have been extensively studied. Quail can do as well in areas 90 percent cropland as in areas 90 percent woodland.

Quail confine most of their daily activities to less than ¼ mile radius. All of the needs of a covey should be within those limits.

Determining the number of coveys for which a land unit can be managed is the first step. Habitat elements needed to support a covey can be easily contained in approximately 15 acre units.

B. Nesting - Breeding season for quail extends from mid-May to mid-August. After pairing off, well hidden grass nests are constructed on the ground in grassy or weedy areas usually within about 50 feet of brushy cover. A clutch of 12 to 15 eggs is laid, one egg a day. These eggs hatch after 23 days of incubation. Incubation is carried out primarily by the hen

but the cock bird does help. Altogether an entire nesting cycle takes 47-55 days. The adults and young then stay together as a family unit until early fall when these units break up to form winter coveys. Sixty to seventy percent of all nests are lost to predators, agricultural activities and wet weather. However, the birds will usually renest after a clutch is destroyed. A quail's average life expectancy is less than a year with three quarters of the population replaced annually by young of the year.

They need nesting cover about 20 inches tall, not dense (approximately 50% bare ground) grass or weeds that will not flood or be otherwise disturbed during the spring and early summer - within 50 feet of brush, woods edge or hedgerow.

Quail nest in grass, weeds, and open woods; 75% of the nests are within 50 feet of a field edge adjoining woods, brush or a hedgerow, preferably in one year old burned over grassy areas near bare soil. One-quarter acre of grassland within 50 feet of cover undisturbed is needed for spring nesting.

C. Escape Cover - is any type of upright growth that will protect the quail from his enemies. Fairly dense brush or briar tangles are needed during the winter; and small blocks of dense shrubs, briars, and vines where the covey can find refuge when pursued by predators, and for protection from winter storms.

II. FOOD REQUIREMENTS

A. General - Food for adult quail is the seeds of most any plant, while the young eat chiefly insects. Food habit studies in Maryland have shown lespedezas, corn, jewelweed, sweetgum,

black locust, poison ivy and honeysuckle to be the most commonly utilized foods. Soybeans, partridge peas, pines, ragweed, beggarweed, oats, sumac, crabgrass, smartweed, millet, barnyard grass, and foxtail are also heavily utilized. In most areas food supplies are adequate except when covered by ice or snow, or too far from cover. Quail generally will not feed over 75 to 100 feet from good escape cover.

Each covey needs at least one 600 square foot block of dense cover; one acre (2 acres on infertile soils) of annual food plants, weeds, and/or grains, within 100 feet of cover, and one-eighth acre of food-producing shrubs.

B. Woody Plants - established according to the specifications for hedgerows or field borders provide escape cover and winter food. Valuable species that provide both are: autumn olive, amur honeysuckle, bayberry, silky dogwood, sumac, multiflora rose, grape vines, Va. - 70 intermediate shrub lespedeza.

C. Woodland - Trees are not of major importance to quail, although they do make some use of woodlands in the fall and winter. Tree species which should be favored because of the food value of their fruit are: black locust, beech, sweetgum, oaks that produce small acorns, ie. water oak, willow oak, etc., pines, mulberry, and sassafras. Evergreens such as Scotch pine can provide valuable dense winter escape cover.

III. WATER REQUIREMENTS

A. General - never a limiting factor because water is usually derived from the food or dew on the vegetation.

APPENDIX K

Deal Island Wildlife Management Area
Trapping Form

INSTRUCTIONS

1. Bids must be in the Regional Service Center by November 3, 1982 at 1:00 P.M. at which time they will be opened. All bids received in this office must be sealed. All bidder are invited to attend. Send sealed bids to the following:

   TRAPPING BID
   Paul D. Wigfield, Regional Manager
   Eastern Regional Office
   Maryland Wildlife Administration
   Department of Natural Resources
   122 Arlington Road
   Salisbury, Maryland 21801

2. The payment on high bids will be accepted only in the form of cash, certified check, money order or bank draft and must be received in this office by NOVEMBER 30, 1982 at 4:30 P.M. If a bid is declined or payment has not been received by November 30, 1982 the bidder:

   A. Forfeits all other bids
   B. Looses the right to bid for the next five (5) years
   C. Looses the right to trap on State-owned land for the next five (5) years

3. You may bid on as many units ad desired; however, no more than two units will be awarded to any one individual and these must be the two highest of his bids.

4. Make sure you include the County, Management Area, Unit Designation and Bid as well as your name, address and phone number on each bid. Do not forget to sign the bid as it is a legal contract.

*****

BURNING, ASSISTANCE AND LICENSE INFORMATION

1. Successful bidders must have a burning permit issued by the District Wildlife Mana
2. The Maryland Forest Service must be notified as to time, date and location of the bur
3. No burning shall take place after March 1, 1983.
4. Burning on some units may be restricted until the close of the waterfowl season. Check with District Wildlife Manager.
5. The successful bidder shall be responsible for the control of the marsh fire.
6. All persons assisting the successful bidder must have a permit card issued by the District Wildlife Manager. This card must be picked up by the successful bidder.
7. All persons trapping on the area must have the appropriate licenses.

APPENDIX L

From "Proposed Work Program for Archeological Investigations of The Rhode River Sanctuary Education Complex, Anne Arundel County, Maryland, Dec., 1982"

Conclusion

The three archeological sites within the 15 acre Rhode River Santuary Educational Complex are potentially eligible for nomination to the National Register of Historic Places and therefore deserve the same protection and consideration as the natural resources of the proposed education center. These sites document at least 1400 years of Indian utilization of the natural resources of the Chesapeake Bay and at least 100 years of American utilization of the same area. The program of intensive site testing presented in this proposal will not only meet the minimum requirement of the Board of Public Works Policy of 1978 and the National Historical Preservation Act of 1966, as amended, but will also present the opportunity to learn about both natural and cultural resources in the Chesapeake Bay region.

While this proposal has been limited primarily to those tasks which must be performed to evaluate the effect of the proposed development on the archeological resources, if the tests reveal a range of artifacts and archeological deposits which can be interpreted, the project archeologists will work with the Tidewater Administration in evaluating potential outdoor and museum exhibits of the findings. Funding is not requested in this proposal to design or implement such exhibits but the concepts can be pursued. This proposal will fulfill the federal and state mandates for the evaluation of the effect of the project on the archeological resources. We hope that in the process, much greater rewards of lasting contribution to public education will result.

Administration

The Board of Public Works Policy States that the Maryland Historical Trust should work with state agencies in accessing the archeological resources on newly acquired land. Therefore, the Maryland Historical Trust requests that funding for the investigations be awarded to the Trust. The Trust will hire qualified staff to conduct the investigations. The principal investigator for the project will be Wayne E. Clark, State Administrator of Archeology. Because of the secondary vegetation, we suggest that fieldwork begin in the spring of 1983 prior to forest growth. A start date of April 6, 1983 is recommended.

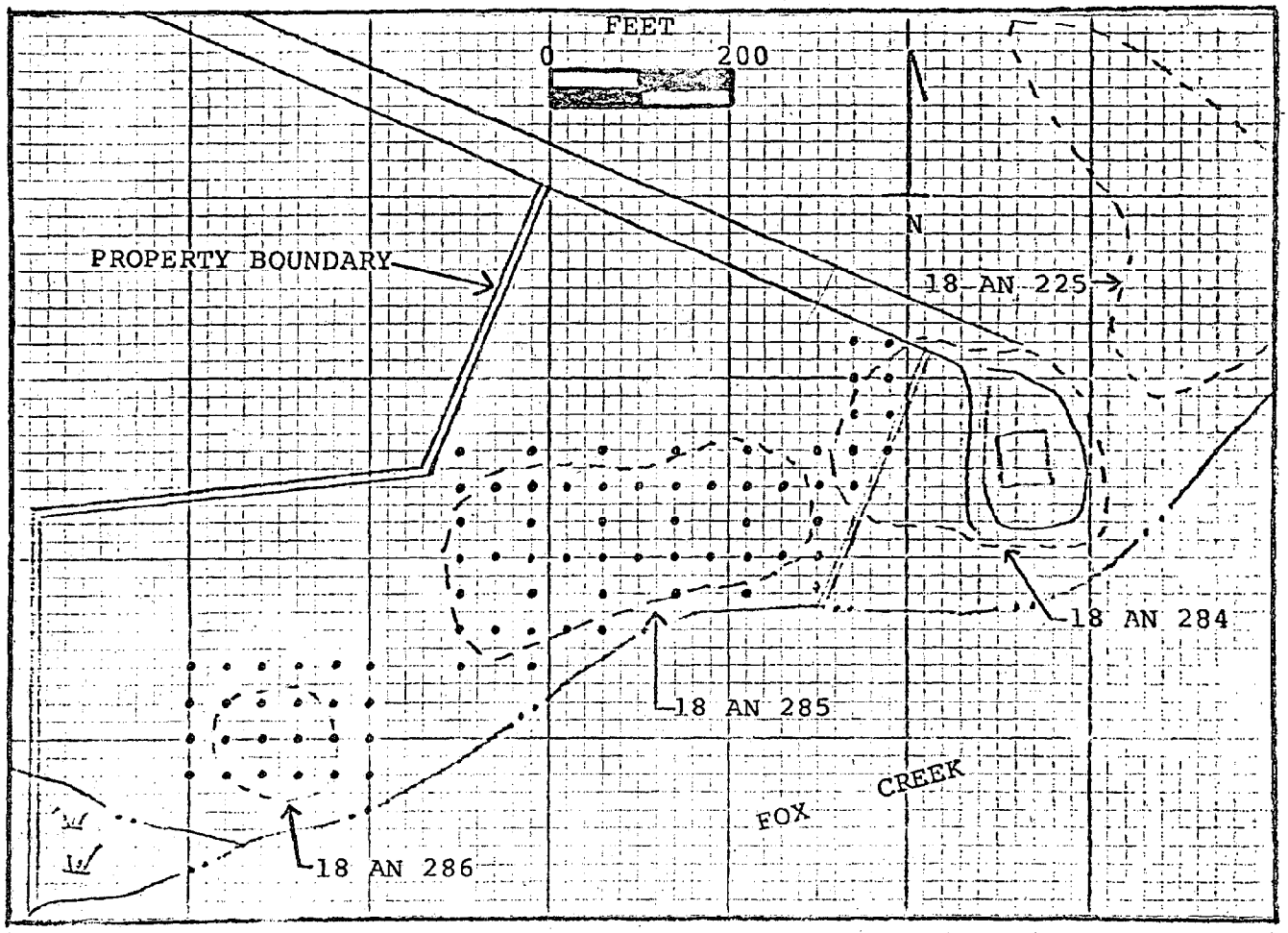


Figure 5: The Study Area showing known archeological sites.

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