U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Office for Coastal Management

January 11, 2016

Mr. Braxton Davis
Director, Division of Coastal Management
NC Department of Environmental Quality
400 Commerce Avenue
Morehead City, NC 28557

Dear Mr. Davis,

This letter is in response to your correspondence dated November 30, 2015, in which you asked for specific information about the process and information that the National Oceanic and Atmospheric Administration (NOAA) requires in consideration of a boundary change to a reserve within the National Estuarine Research Reserve System (NERRS). You explained that the North Carolina Department of Environmental Quality intends to conduct a study regarding a proposed boundary change to the Zeke's Island component of the N.C. NERR. The process and required information for consideration of the proposed boundary change are outlined below. For more information, please refer to Section 315 of the Coastal Zone Management Act (CZMA), 16 U.S.C. § 1461; Title 15 Code of Federal Regulations (C.F.R.) Part 921; and the 2013 Reserve System Management Plan Guidelines and Resources ("Guidelines") (attached).

Under 15 C.F.R. § 921.33, a boundary change requires written approval from NOAA. Guidelines at p. 47. 'Proposed additions for inclusion in a NERR' should meet the following criteria: (1) the boundary should encompass an adequate portion of the key land and water areas of the natural system to approximate an ecological unit; (2) adequate state control of the site(s) must be established; and (3) the site should be suitable for long-term research and be important for education and interpretive efforts. Guidelines at p. 47; 15 C.F.R. §§ 921.1(e), 921.11(c)(3)-(4).

NOAA requires the following specific information to be submitted by a reserve proposing a boundary modification: 1) describe the proposed lands to be added or deleted by defining the location, acres, habitats, and existing uses, and state the total acreage of the new boundary, after explaining why lands and/or waters are proposed for addition or deletion; 2) provide a map depicting original boundary and new (expansion or contraction) boundary; 3) provide a brief history of the additional lands (if expanding); 4) provide the rationale for expansion – the benefits these lands and/or waters provide to the reserve from an ecological and/or programmatic perspective; 5) depict core and buffer zones on the new boundary map; 6) identify land ownership and type on the new boundary map; 7) identify how lands will be managed and the responsible parties for management; 8) identify how lands will be used, e.g. value to program efforts, public access, or otherwise. Guidelines at p. 47.

As an initial step, the State and reserve managing agencies should coordinate with NOAA to transmit the above information, and to conduct discussions on additional issues. With respect to the proposed boundary modification to the Zeke's Island component, additional issues for discussion include (1) the change to the core area of the reserve and (2) the disposition of the parcel potentially proposed for removal. These issues are discussed in more detail here.

First, it is important to note that the area potentially proposed for removal, as part of the Zeke's Island component, is designated as a "core area" of the reserve – a key land and water area within the reserve that is so vital to the functioning of the estuarine ecosystem that it must be under a level of control sufficient to ensure the long-term viability of the reserve for research on natural processes. N.C. NERR Management Plan 2009-2014, Fig. 4 at p. 153 (depicting the core areas of the reserve); 15 C.F.R. §§ 921.11(c)(3), 921.30(a)(2). Accordingly, should this parcel be proposed for removal, it is important that the State and reserve managing agencies coordinate closely with NOAA, including preparation of appropriate documentation, to ensure that the continued designation of the reserve is viable and that the intent of the regulations is met.

Second, because NOAA provided funds for the purchase of the Zeke's Island component, if the parcel is proposed for removal, NOAA would need to consult with the State and the reserve managing agencies on potential disposition of the property, including retention of title. 15 C.F.R. § 921.21(e)(2). Accordingly, the State and reserve managing agencies should coordinate closely with NOAA on this issue as well.

In addition to the above, the following steps are also included in the boundary modification process under the applicable regulations. Public notice and an opportunity for public comment on the proposed modification should be provided; NOAA would place a notice in the Federal Register, and the State would be responsible for publishing an equivalent notice in local media. 15 C.F.R. § 921.33(a). Review for compliance with the National Environmental Protection Act would need to be completed, including, if required, preparing a categorical exclusion document, an environmental assessment, or an environmental impact statement, as well as conducting any resulting consultations with other federal, state, or tribal entities that may be determined to be necessary. 15 C.F.R. § 921.33(a). Federal consistency review under the CZMA may also be required. 15 C.F.R. §§ 921.4(b), 921.30(b). A memorandum of understanding (MOU) must be drafted between the state agency and the land managing partners, if different from the state agency, to affirm that the lands will be managed in accordance with Reserve System regulations, and the MOU must be included as an appendix to the management plan revision. Guidelines at p.47; 15 C.F.R. § 921.13(a)(11). Finally, if the boundary modification is approved, notice of the approval must be published in the Federal Register, and if necessary, NOAA will revise the designation document for the site. 15 C.F.R. § 921.33(a).

Thank you for contacting me about this early in the process. I have attached the Reserve System regulations and Management Plan Guidelines and Resources to support the above references. Please contact me at 240.533.0781 or at Erica.Seiden@noaa.gov if you have questions and/or to discuss further.

Best regards,

Erica Seiden

cc: Tom Reeder, Assistant Secretary, Department of Environmental Quality
Rebecca Ellin, Coastal Reserve Program Manager, Division of Coastal Management
Joelle Gore, Stewardship Division Chief, NOAA Office for Coastal Management
Stephanie Robinson, Coastal Management Specialist, The Baldwin Group at NOAA Office for Coastal Management

NATIONAL ESTUARINE RESEARCH RESERVE SYSTEM

Reserve System Management Plan Guidelines and Resources

2013

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Acronyms

ADCNR	Alabama Department of Conservation and Natural Resources
CCIP	Climate Change Implementation Plan
CFR	Code of Federal Regulations
CICEET	Cooperative Institute for Coastal and Estuarine Environmental Technology
CTP	Coastal Training Program
CZMA	Coastal Zone Management Act
EA	Environmental Assessment
EIS	Environmental Impact Statement
ENOW	Economics: National Ocean Watch
GRF	Graduate Research Fellowship Program
GTM	Guana Tolomato Matanzas
HVAC	Heating, ventilation, and air conditioning
KEEP	K-12 Estuarine Education Program
LEED	Leadership in Energy and Environmental Design
LID	Low Impact Development
MOU	Memorandums of Understanding
NEPA	National Environmental Policy Act
NERR	National Estuarine Research Reserve
NERRS	National Estuarine Research Reserve System
NOAA	National Oceanic and Atmospheric Administration
NPED	National Policy and Evaluation Division
NRCS	Natural Resources Conservation Service
NSC	NERRS Science Collaborative
PAC	Procurement, Acquisition, and Construction
PAR	photosynthetically active radiation
PEA	programmatic environmental assessment
PRISM	Parameter-elevation Regressions on Independent Slopes Model
SMART	specific, measurable, attainable, relevant, and time-bound
SOVI	Social Vulnerability Index
STICS	Spatial Trends in Coastal Socioeconomics
SWMP	System-Wide Monitoring Program
SWOT	strengths, weaknesses, opportunities, and threats
USFWS	U.S. Fish and Wildlife Service

Introduction

The National Estuarine Research Reserve System (NERRS or Reserve System) is a network of 28 areas representing different biogeographic regions and estuarine types within the United States that are protected for long-term research, monitoring, education, and coastal stewardship. Established by the Coastal Zone Management Act of 1972, as amended, the Reserve System is a partnership program between the National Oceanic and Atmospheric Administration (NOAA) and the coastal states.

As part of this partnership, federal regulations require reserves to have a NOAA-approved management plan that is updated every five years (15 C.F.R. Part 921.13). NERRS management plans serve as the foundation and guide for reserve activities; collectively they describe the capacities of the Reserve System. These documents can be used as source documents for other internal and external partner programs such as the National Estuary Program and the Coastal Zone Management Program, as well as national efforts such as the National Climate Assessment. NOAA works collaboratively with each reserve to support the development and approval of its management plan, and to ensure compliance with federal regulations and alignment with national priorities and programs.

These guidelines are organized into two parts. **Part I** provides information about the process and timeline for writing a management plan and provides a suggested framework and preparatory steps for writing an integrated strategic plan as part of completing the management plan. **Part II** provides specific information required in each component of the plan, including questions to promote thinking about current status and opportunities, required and optional elements, case studies, references, tools, and resources.

Purpose of a Reserve Management Plan

Reserves are increasingly confronted with anthropogenic and natural stressors and must plan for the continued protection and use of the reserve for research, education, and public access. Reserves are also grappling with complex questions regarding new uses in or near reserves that may or may not be compatible with the Reserve System's mission. A comprehensive management plan will provide a foundation for addressing the challenges of protecting and managing a reserve. Therefore, the purpose of a reserve management plan is to

- Provide the vision and framework to guide reserve activities during a five-year period;
- Present opportunities to discuss reserve niche and strategic collaborations with partners;
- Communicate how the reserve is addressing priority coastal management issues through their stated goals, objectives, and strategies;
- Highlight reserve priorities and staff capabilities to address those priorities;
- Demonstrate how Reserve System programs are locally relevant and nationally significant;
- Enable the reserve and NOAA to track progress and determine opportunities for growth; and
- Position the reserve to acquire facilities construction and land acquisition funds.

Key Changes from 2006 Reserve Management Plan Guidelines

Within the last six years, almost all reserves have revised a management plan. This experience provides information to draw from about the process of creating management plans. Additionally, the Reserve System has grown and matured in the areas of strategic planning and program development and is addressing new challenges such as climate change. This guidance is intended to support each reserve in creating a management plan to meet current challenges. Therefore, this document contains several updates to and modifications of the *NERR Management Plan Guidelines 2006*:

- This guidance promotes a **query-based approach** by providing thought provoking questions to help reserves craft components of the management plan.
- The Reserve System created the "2011-2016 Reserve System Strategic Plan" which outlines three focus areas: water quality, habitat protection, and climate change. While water quality and habitat protection have been a focus of the Reserve System since its inception, **climate change is a new focus**. A changing climate will have profound impacts on coastal resources, communities, and infrastructure. It will be imperative to understand impacts and consider options for adapting to and mitigating these impacts. Considering climate change in all aspects of planning and programming is encouraged.
- Coastal management within the context of these three focus areas is sufficiently complex to require an **adaptive management approach that guides** strategic planning**.** This approach is emphasized and encouraged because , it supports collaborative learning, application of management actions based on current knowledge, and evaluation of actions that result in improved resource management.
- Creating an **integrated strategic plan** that leverages these skills and assets to address local priorities and system-wide goals is encouraged. An adaptive management approach can effectively support an integrated planning process where each reserve sector contributes expertise to comprehensively assess the issues and create solutions to coastal management challenges.
- While an integrated approach to strategic planning is encouraged, the **system-wide foundational programs** in research and monitoring, education and outreach, and coastal training help define the reserve niche. Foundational programs provide context for why and how the reserve will address their coastal management issues and support reserve goals by implementing integrated strategies. It is important to discuss these programs in a national and local context.
- It is important to understand why the objectives within the management plan have or have not been achieved during the five-year period. This will inform future management choices and focus for revisions to the plan. While not required, reserves are encouraged to **develop reserve-based performance measures** to track program performance and outcomes. Performance measures and their outcomes should be directly related to reserve objective statements.
- Understanding both the **natural and social context of the reserve** is necessary to effectively manage the resources. Improved coastal management starts with educated citizens making informed choices about natural resources. Therefore, it is essential to understand the dynamics of both natural and human communities.
- **References and resources** are included in each section of the guidance that provide information, tools, and additional guidance for adequately addressing specific topic areas.

Components of a Management Plan

Per federal regulations, 15 C.F.R. Part 921.13, management plans must describe the reserve's most pressing coastal management issues; goals, objectives, and actions for addressing those issues; plans for administration, research, education/interpretation, public access, construction, acquisition, and resource protection;, restoration and habitat manipulation, if applicable; and they must include a memorandum of understanding between NOAA and the state agency.

Required and optional components for management plans are listed below.Additional information, including a checklist for each required component can be found in Part II: Guidance for Reserve Management Plan Components.

Required Components	Optional Components
• Executive Summary • Introduction to the Reserve System • Introduction to the Reserve Strategic Plan • Program Foundations* – Research and Monitoring – Education – Coastal Training • Administrative Plan • Resource Protection Plan • Public Access and Visitor Use Plan • Facility Development and Improvement Plan • Acquisition Plan • Resource Manipulation Plan (If applicable) • Restoration Plan (If applicable) **Appendices:** • NERRS Regulations • Memorandum of Understanding between State Host Agency and NOAA • All Memorandums of Understanding between land managers within the reserve • Federal Consistency Determination • Public involvement and comments * See Program Foundations Chapter for options regarding organization of this material.	• Communications Plan • Volunteer Plan • Vessel and Vehicle Plan • Habitat Mapping and Change Plan • Contingency or Hazard Response Plans • Special Area Plans

Figure 1 illustrates the relationship between reserve management plan components that is necessary to meet reserve target audience needs. 'Introduction to the Reserve System' and 'Introduction to the Reserve' provide context for all subsequent components of the plan. The reserve strategic plan, which includes reserve goals, objectives, and actions, is at the heart of the management plan. Reserve people (i.e., administration), infrastructure (i.e., facilities), and the management authorities that protect the reserve serve as foundations for establishing and accomplishing goals and objectives. Reserve research and monitoring, education, training, and stewardship sectors work together in an integrated fashion to support implementation of the strategic plan. Stewardship functions are captured within the research and

monitoring, resource protection, public access, and land acquisition components, as well as in the optional restoration and resource manipulation components. The Program Foundations component captures information for each system-wide program including context, capacity, delivery, needs, and opportunities. Finally, it should be noted that reserve programs operate within the context of the Reserve System and state agency priorities that are relevant to the reserve. Evidence of alignment with these priorities should be apparent throughout the plan.

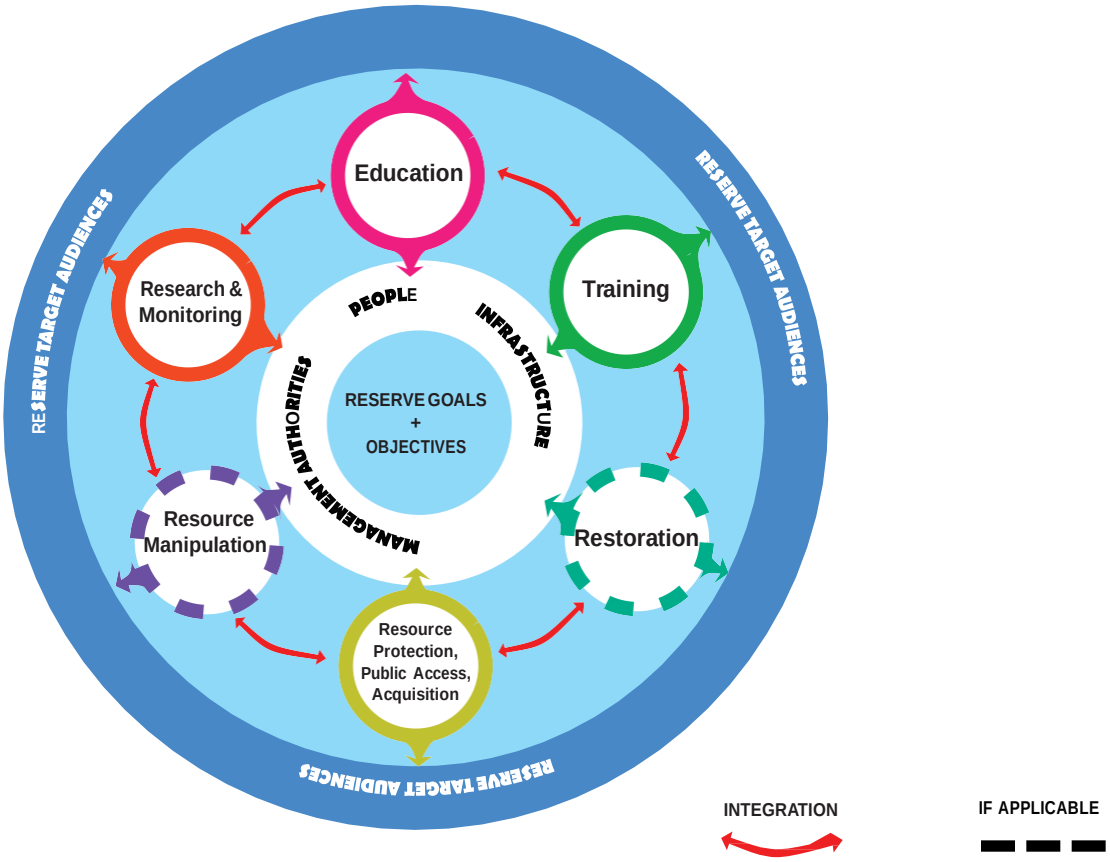


Figure 1. Relationship of Reserve Management Plan Components

How to Use These Guidelines

These guidelines are broken into two parts. **Part I** provides information to help reserves as they prepare to write or update their management plans, with particular focus on strategic planning. This section also includes information about the process, timeline, and responsibilities for the reserve and NOAA.

Part II provides specific information to support development of each component of the plan, including:

- questions to promote thinking about current status and opportunities
- required and optional elements
- case studies
- references
- tools and resources

NOAA will use the thought-provoking questions in this section as a guide when reviewing management plans. Each management plan revision should be a close collaboration between NOAA and the reserve. The revision process should begin with a discussion between the NOAA liaison and the reserve manager to discuss this guidance, the approach to the plan, and the timeline for completing the plan.

These guidelines can be found on the NERRS Intranet, under NERRS Guidance, Policy and Planning documents, sub-tab Management Plans (*www8.nos.noaa.gov/nerrsintranet/home.aspx*).

Part I: Process and Approach for Developing or Revising a Reserve Management Plan

Part I provides information regarding the process, timeline, and approach for writing a management plan, including: creating and implementing a strategy for plan revision, confirming priorities and achieving integration, engaging stakeholders, and tips for writing the strategic plan component. A process map and timeline is included that outlines steps and staff involved. Federal requirements include Federal Consistency, environmental compliance, public involvement, and the approval process.

The Process of Writing a Management Plan

Creating a Strategy for Plan Revision

Before beginning the management plan revision, reserves should have a strategy for determining primary coastal management issues; reserve and program niche and impacts; how to interact with the public throughout the management plan revision process; and the roles and responsibilities related to completing the plan (the next section provides a list of guiding questions to help establish the coastal management issues relevant to the reserve that also support national priorities).

A. Managing the Process

Reserves may decide to develop their plans in-house or through a contract, or a combination of both may be applied. There are advantages and disadvantages to each approach.

If reserves choose to develop the plan without outside support, they have complete control over the process and the quality. However, it is very time consuming for the entire staff. To ensure a smooth process, reserves should assess whether their staff has the appropriate skills (writing, editing, project management, facilitation) and the time to dedicate to the project. The plan will benefit from a lead that establishes clear expectations, consistent writing assignments, and keeps the group working toward an agreed upon timeline. If chapters are to be written by separate staff, establish a common outline for those chapters before beginning to write and make sure an editor or the plan lead will be making revisions so that the document is consistent in style and voice.

Contracting out part or all of the process means that some of this work will be done by other people, saving reserve staff time. Reserve staff will still have a big time commitment to provide the content and perspectives needed, and if the reserve is not satisfied with the contractor, the process can be expensive and unproductive. Interview contractors ahead of time, be clear about what the reserve needs help with (is it facilitating the strategic thinking, writing, editing, graphical support, etc.) and make sure they have the expertise to support those needs. Based on a 2007 survey of managers, over half of reserves employ

outside expertise to complete their plans. Additional results of this survey regarding management plan process and content can be found on the NERRS intranet homepage, under NERRS Guidance, Policy and Planning documents, sub-tab Management Plans.

B. Confirming Your Priorities

The first step in revising a management plan is to establish the priorities that reflect the reserve's unique niche and complement other management efforts in the area. First steps for identifying priorities are:

1. Review existing state or agency priorities, the Reserve System Strategic Plan, site- specific needs assessments, program strategies, site profiles, and other planning documents.

2. Use existing advisory groups or set up a Management Plan Advisory Group to ground truth coastal management issues and niche.

3. Use surveys and/or focus groups with thought leaders, surrounding community, key partners, etc. to determine coastal management issues and niche.

Narragansett Bay Reserve: Finding Their Niche

At the start of their management plan development process, the Narragansett Bay Reserve conducted a survey with the public and ran a series of focus groups with key partners to provide input on the niche of the reserve in their watershed. For a description of their process and information about the questions they used, see the appendix in their 2010 Management Plan (*www.nerrs.noaa.gov/Doc/PDF/Reserve/NAR_MgmtPlan.pdf*).

C. Planning Strategically

Once the reserve identifies the priority issues and their niche, the reserve should identify the desired impact reserve programs will make during the five years that the plan is in effect. There are many tools available to help organizations think strategically about where they want to be and what they want to change. Examples familiar to reserves include SWOT (strengths, weaknesses, opportunities, and threats) analysis, Logic Models, Structured Decision-Making, issue-based planning, etc. NOAA encourages reserves to research different options for approaching strategic planning, and to choose one appropriate for the reserve. Basic steps in the process are included within the "Preparing to Write a Strategic Plan" section of these guidelines. Reserve strategic planning processes should result in development of goals that identify how the reserve will influence the priority coastal management issues of the local area by using and strengthening existing programs to address gaps and needs. The strategic plan component of the management plan should not be a list of current reserve activities. Reserves should articulate desired impacts and achievable actions using a set of goals, objectives and strategies. This is often a challenging process, and may benefit from facilitation expertise. It is important to involve staff and key partners, as appropriate, in this process.

D. Achieving Integration

If reserve strategic goals are focused on the impact the reserve will have on priority coastal management issues in the next five years, those goals are likely to require the effort of many staff members in a coordinated way.

Chesapeake Bay, Virginia Reserve: Program-Based Strategic Planning

The Chesapeake Bay Virginia management plan is organized by foundational program chapters. Those chapters are linked to priority coastal management issues identified in the beginning of the plan through the use of symbols. Goals and objectives in each chapter have one or more symbols next to it, indicating which coastal management issues that goal or objective supports (*http://nerrs.noaa.gov/Doc/PDF/Reserve/CBV_MgmtPlan.pdf*).

While NOAA regulations require plans for research, monitoring, and education, reserves are encouraged to create a strategic plan that shows how an objective is accomplished by multiple sector specific actions/strategies. As long as actions are associated with a sector or multiple sectors, this approach meets the regulations. If reserves start with the goals related to the coastal management issues and then think about how foundational programs and staff support those goals, there is a higher chance of being able to illustrate connections between your coastal management issues and foundational programs.

San Francisco Bay and GTM Reserves: Issue-Based Strategic Planning

The San Francisco Bay, California, and Guana Tolomato Matanzas (GTM), Florida, management plans provide information on the programmatic descriptions separate from identification of issue areas with associated integrated goals, objectives and actions. This approach allows for clear leadership of actions to be provided within the context of an issue, goal and objective important to the entire reserve (*http://nerrs.noaa.gov/Doc/PDF/Reserve/SFB_MgmtPlan.pdf and http://nerrs.noaa.gov/Doc/PDF/Reserve/GTM_MgmtPlan.pdf*).

E. Engaging Stakeholders

It is important to involve key stakeholders in the management plan development and/or revision process, Including the people that can help the reserve accomplish its goals, close working partners, groups that may be doing similar or related work, and the reserve's biggest supporters or detractors. A plan should involve these people at appropriate stages throughout the process. Involving existing advisory boards or creating new ones specifically for this task can help reserves refine their local role, engage the public, guide programs, tap local expertise , and identify duplicative efforts or opportunities to partner and increase effectiveness. Be explicit with advisory board members about their role, time commitment, and how their input will be used.

Engaging staff throughout the management plan process is critical to success, not only in completing the document but in implementing the plan. Be clear about time expectations and deliverables with staff in the beginning of the process, use good facilitation to make sure staff views are heard and incorporated into the plan, and set up regular meetings and/or agreed upon communication avenues to make sure everyone stays on track and is aware of new developments. Understanding the many demands upon staff time and creating incentives for participation will be important.

Public involvement is very useful in developing a management plan. Engaging the public throughout the process (e.g. a kick off public meeting, a meeting to go over a draft, and a final public comment meeting) will ensure that people feel a part of the process and have an opportunity to comment on the direction of the plan as it evolves and becomes more detailed. If you anticipate that contentious issues may arise, NOAA should be informed. It may be helpful to engage a neutral facilitator or mediator who has experience with public conflict resolution.

Review and Approval Process

Timeline

Developing or revising a management plan should take no more than 12-18 months. Some reserves may assess and modify their management plans continuously, which reduces the time investment when a revision is due. Revised management plans should be approved by NOAA on or before the previous plan's expiration date, which is five years after the current plan's notice of approval in the Federal Register. The timeline in the table below lists the steps for developing or revising the plan. Reserves are encouraged to develop a timeline for the management plan revision that includes these steps and any other steps needed to meet local and/or state requirements. NOAA will be a partner in completing the management plan, so all correspondence and progress should be documented by both NOAA and the reserve to ensure continuity of operations, regardless of staff turnover.

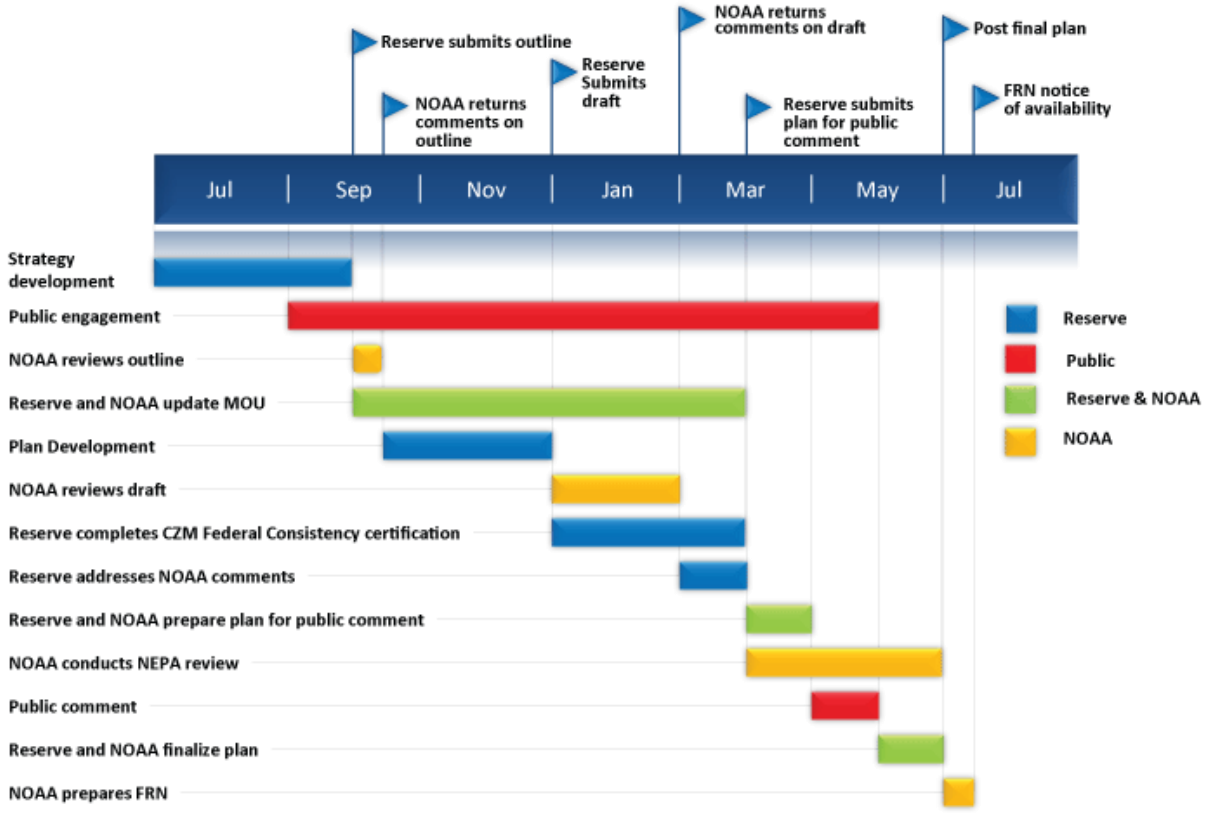
The plan is considered complete and ready for approval after all comments have been addressed. NOAA will then draft a Federal Register Notice announcing the availability of the approved plan. NOAA will also send a letter of approval to the state agency, with a copy to the reserve. The approval letter and Federal Register Notice is filed at NOAA. The official management plan approval date is the day that the Federal Register Notice is published. Plans should be made available on the reserve and NERRS website.

Reserve Management Plan Development Timeline

Action	Reviewer	Time
Reserve discusses strategy for plan development and creates timeline for project with NOAA liaison	Reserve NOAA liaison	Variable: 12 to 18 months before expected completion date
Reserve submits outline to NOAA liaison	NOAA liaison	NOAA liaison will provide consolidated comments within two weeks of receipt of outline
Reserve involves stakeholders/public to inform plan contents (at discretion of reserve)	Reserve/stakeholders	Throughout the revision process
Reserve identifies all Memorandums of Understanding (MOU) that require updating and works with partners to update Note: the MOU between the state host agency and NOAA should follow the template provided in Appendix 1	Reserve Program partners NOAA (if applicable): NOAA liaison will coordinate appropriate reviewers	Variable Note: MOUs can take several months to review due to legal review procedures
Reserve develops plan	Reserve Stakeholders (optional) NOAA liaison	Variable
Reserve submits drafts of chapters for preliminary NOAA feedback (optional)	NOAA liaison	NOAA liaison provides comments within two weeks per chapter submission
Reserve submits complete draft of plan to NOAA electronically	NOAA liaison NOAA coordinators for research, monitoring, education, training, and stewardship General Counsel for Ocean Service (GCOS)	NOAA liaison will provide consolidated comments within two months of receipt of draft

Action	Reviewer	Time
Reserve submits complete draft to state agency	State agency representatives	Variable
Reserve submits complete draft to Coastal Zone Management Program representative for Federal Consistency certification Note: Please use Federal Consistency template found in Appendix 2	Coastal Zone Management Program representative	Variable
NOAA and Reserve manager/staff discuss comments on plan and resolve outstanding questions/issues based on NOAA, state agency and state coastal zone management plan reviews	NOAA liaison Reserve manager/staff	Variable
Reserve submits final plan for approval	NOAA liaison NOAA program lead	Two to four weeks
NOAA conducts National Environmental Policy Act (NEPA) review of plan and prepares findings. Appendix 3	NOAA liaison NOAA NEPA coordinator	Three months
NOAA prepares a Federal Register Notice providing a 30-day public comment period on the plan and NEPA assessment	NOAA liaison NOAA program lead	Two weeks
Reserve simultaneously prepares a similar notice for 30-day public comment period and posts draft plan to reserve website (plan must include Appendix 4)	Reserve manager/staff	Same week as above
Reserves are encouraged to hold a public meeting to brief stakeholders on the management plan	Reserve manager/staff	One day

Action	Reviewers	Time
NOAA liaison brief NOAA program lead	NOAA liaison NOAA program lead	One day
After the 30 day comment period, Reserve addresses all comments receive and adds appendix to plan that outlines how comments were addressed. NOAA amends, as applicable, the site specific environmental assessment. A template for public comment can be found in Appendix 4.	Reserve manager/staff NOAA liaison NOAA NEPA coordinator	Reserve and NOAA work together to address comments within one month of receipt of comments
Reserve posts final plan on Reserve Website; NOAA posts final plan on NERR Website (note: Reserve should submit updated boundary map to CDMO)	Reserve manager/staff NOAA liaison	One day
NOAA approves final NEPA documentation	OCRM NEPA coordinator	Two Weeks
NOAA prepares Federal Register Notice announcing the availability of the plan and sends to Federal Register for publication	NOAA liaison NOAA division chief OCRM director	Two weeks
NOAA prepares and submits letter of approval to state host agency/university director with cc: to appropriate state host agency and coastal management plan representatives	NOAA liaison NOAA program lead	One week


Reserve submits outline
NOAA returns comments on outline
Reserve Submits draft
NOAA returns comments on draft
Reserve submits plan for public comment
Post final plan
FRN notice of availability
Jul
Sep
Nov
Jan
Mar
May
Jul
Strategy development
Public engagement
NOAA reviews outline
Reserve and NOAA update MOU
Plan Development
NOAA reviews draft
Reserve completes CZM Federal Consistency certification
Reserve addresses NOAA comments
Reserve and NOAA prepare plan for public comment
NOAA conducts NEPA review
Public comment
Reserve and NOAA finalize plan
NOAA prepares FRN
Reserve
Public
Reserve & NOAA
NOAA

Following the Regulations

Specific requirements involved in revising a management plan (including MOUs, NEPA, Federal Consistency, and the public involvement and plan approval processes) include:

1. Memorandums of Understanding

A memorandum of understanding between the state and NOAA regarding the federal- state relationship that expresses the long-term commitment by the state to maintain and manage the reserve in accordance with Section 315 of the Coastal Zone Management Act, 16 U.S.C. 1461, and applicable regulations, is required. Additionally, all other necessary MOUs must be included in the plan (15 CFR Part 921.13 (a)(11)). Examples of additional MOUs are those agreements between the state agency and other entities that manage land within the reserve. These agreements should ensure that all lands within the reserve are managed for the purposes by which the reserve was established and are coordinating management activities. The template for the MOU between NOAA and the reserve host agency can be found in Appendix 1.

2. Federal Consistency

If the state has a federally approved coastal management program, the final plan must include a certification that the National Estuarine Research Reserve is consistent to the maximum extent practicable with that program. This is required by our regulations; see Sections 921.13 (a), 921.4(b) and 921.30(b). To satisfy this requirement, the reserve and state coastal management program should work together to ensure that the plan is consistent to the maximum extent possible with the enforceable policies. The reserve will submit the template (Appendix 2) and NOAA will review and certify the consistency certification, if in agreement. For additional information on Federal Consistency, please see *http://coastalmanagement.noaa.gov/consistency/welcome.html*.

3. Environmental Compliance

The National Environmental Protection Act (NEPA) is the tool NOAA will use to evaluate environmental compliance with applicable rules and regulations. NEPA requires federal agencies to undertake an assessment of the environmental effects of their proposed actions prior to making decisions. The NEPA review can result in one of three determinations:

(1) If the action is unlikely to cause any environmental harm, it is qualified as a categorical exclusion.

(2) If it is uncertain if there will be environmental effects, an Environmental Assessment (EA) is conducted by NOAA.

(3) If significant environmental effects may or will occur, an Environmental Impact Statement (EIS) must be prepared.

National Administrative Order 216-6 determined that management plans cannot be categorically excluded. NOAA's General Counsel Ocean Service and NOAA's Program, Planning and Integration Division also determined that NOAA should develop a programmatic environmental assessment (PEA) to cover all reserve management plan revisions. NOAA will work with the designated NEPA coordinator to draft this assessment. Once this assessment is complete, it will be applied to all management plan revisions. Plan components potentially requiring additional assessment if and when funded by NOAA include all construction activities (including trail development), land manipulation activities, invasive species control activities, restoration activities, and boundary changes. Each operations, construction, and land acquisition award will be assessed for environmental compliance and may require additional topic specific environmental assessments. Additional resources on NEPA can be found at *www.epa.gov/compliance/basics/nepa.html* and *www.nepa.noaa.gov*.

4. Public Involvement

Community members are important constituents and partners to reserves. Developing a public involvement strategy for developing your management plan is important to engage the community in your work, seek their advice and expertise in your programming, and ensure that you are aware of any potential conflicts. Ideally, public input would be sought at several points in the process of developing a management plan and responses to those comments would be easily accessible to the public during the process. Management plan revisions will be published in the Federal Register Notice for a 30-day public review and comment period. The reserve is responsible for publishing an equivalent notice in the local media to provide a 30 day public comment period when the draft is completed. If comments are submitted during the public review comment period, they should be addressed, as reasonable, and incorporated into the plan. These comments and a description of the public process should be included as an appendix of the final plan. An example can be found in Appendix 4.

5. Approval Process and Compliance

The plan is complete and ready for approval after NOAA and public comments have been addressed. NOAA will draft a Federal Register Notice announcing the availability of the approved plan. NOAA will send a letter to the state agency (cc: reserve) notifying them of the approval date. The day that the Federal Register Notice announcing the plan is released is the official management plan approval date. The plan is valid for five years from that date. The next draft plan should be submitted to NOAA prior to that expiration date. The approval letter and Federal Register Notice is filed at NOAA.

Adaptive Management Approach to Strategic Planning

About This Section

The Reserve System addresses complex coastal management issues by integrating and applying research, education, training and stewardship expertise within the current network of 28 protected areas. The Reserve System is focusing investment and expertise to address climate change, water quality and habitat protection challenges. These nationally significant issues require specific and strategic local response best achieved through adaptive management whereby improved understanding of resources leads to improved management choices and ultimately improved protection of the resources. (Williams, et al. 2009) This section describes the elements of adaptive management and the relevance to the Reserve System. This framework is provided as background to consider when conducting strategic planning.

What Is Adaptive Management?

As defined by the National Research Council, adaptive management is "a decision process that promotes flexible decision-making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood." It is a structured approach for improving resource management by learning from these outcomes. (Sexton, et. al., 1999)

"Ecosystems are not only more complex than we think; they're more complex than we can think."

– Egler

Why Is Adaptive Management a Good Choice for the Reserve System?

The Reserve System has a mandate to protect and preserve estuarine environments for specific purposes and is well suited and designed to monitor and apply knowledge in a long-term capacity to improve coastal management. The Reserve System's place-based network provides an ideal platform for iterative decision-making whereby clear objectives can be identified, monitored, and adapted. Furthermore, reserves are well suited to undertake this approach given the criteria and key elements discussed in the next section. We have a mandate, mission, and institutional capacity to address many of the pressing coastal issues, such as climate change, that create implicit uncertainty in environmental conditions and hence require a flexible approach to dealing with them.

"Knowledge has to be improved, challenged, and increased constantly, or it vanishes."

– Drucker

Key Elements of Adaptive Management

When applying an adaptive management approach, two key conditions should be met: (1) there must be a necessary mandate to take action in the face of uncertainty and the problem must be important enough to require action of some kind and (2) there must be institutional capacity and commitment to sustain an adaptive program that includes long-term measurement and evaluation of outcomes. (Lee, 1993; Wilhere, 2002) In addition to these two overarching conditions, there are additional elements or conditions for adaptive management that must be in place to be successful. (Williams et al. 2009) These are referenced in Figure 2 and include:

1. **Adequate baseline understanding and assumptions about the system** being managed as a foundation for learning. From this understanding, appropriate management objectives and actions can be determined.

2. **Clear and measureable management objectives** should be identified to measure progress and understand when it is appropriate to re-evaluate actions.

3. **Opportunities to select from a range of management actions** to meet objectives. The use of current information based on prediction rather than assumption to make these determinations is important in an uncertain environment. Actions should be multi-disciplinary, participatory and should be evaluated for impacts and consequences. Additionally, where feasible, it is important to explain uncertainty using testable models- conceptual, qualitative and/or quantitative depending on capacity.

4. **Mechanisms for incorporating learning to inform future actions** should be used throughout the process. This assumes that the process, institutions, and actions themselves are flexible enough to account for learning and the application of that knowledge. It is ideal when responses to management actions can be assessed before a decision about the next management action is made. Organizations must monitor, assess and re-evaluate.

5. **Monitoring that can be established and maintained** to evaluate outcomes of actions. Adaptive management requires measuring the response to actions taken to determine if the program is on track to meet objectives or needs to re-evaluate actions.

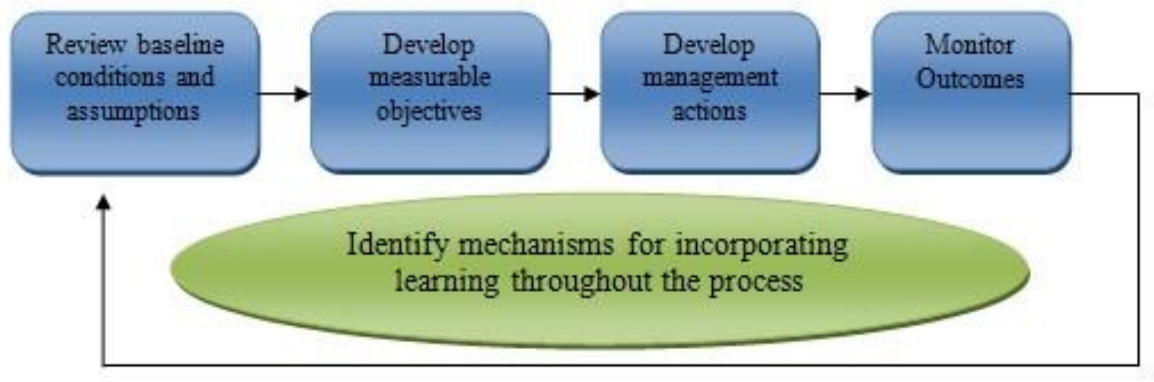


Figure 2. Adaptive Management Approach to Strategic Planning for the Reserve System

In order to create informed objectives, it is important to understand the baseline conditions and actions that have brought the system to its current state. Reserves have resources (e.g., ecological characterizations, System-Wide Monitoring Program (SWMP) data and syntheses, and stakeholder information from Education and Coastal Training Program activities) that provide a baseline of information to create measurable objectives, implement management strategies, monitor and assess their efficacy, communicate success and/or challenges and re-evaluate to determine subsequent management actions. Flexibility is important in the decision- making process where management actions are re-visited in response to measured outcomes. (Doremus et.al. 2001) Figure 2 above shows how adaptive management is applied to the Reserve System strategic planning framework.

Linking Local and National Priorities in the Context of Adaptive Management Planning

Using management plans and the concept of adaptive management is contingent on knowing the context of what you want to achieve in terms of the local reserve priorities and how they relate and contribute to the priorities of the state agency and the Reserve System. These priorities provide the context for reserve planning and contribute to work that is complementary, not duplicative, of other state and local programs. More information about defining the reserve's niche within the context of local, state and national priorities is identified in the next section 'Preparing to Write a Strategic Plan'.

The questions below, as well as the information above on adaptive management, are good starting places to help the reserve conceptualize the scope and scale of the management plan and to begin preparing the reserve to identify niche, goals, and objectives.

Waquoit Bay Reserve: Aligning National and Local Priorities

The 2011-2016 Reserve System Strategic Plan describes three areas for strategic focus and investment, including water quality. For Waquoit Bay, this national priority is also a local priority; specifically nitrogen pollution. The communities surrounding Waquoit Bay are facing difficult decisions as they grow. Current septic systems are not doing a good enough job keeping nitrogen out of Cape Cod's waters; and this is leading to water pollution that threatens the environment, quality of life, and the livelihood of this tourist destination. Over the past twenty years, the Waquoit Bay Reserve has attracted researchers from around the world to study the sources and impacts of nitrogen in the bay. CICEET and GRF projects have focused on this topic, reserve-led monitoring is linked to this topic, and reserve-led research and synthesis of research has contributed to a wealth of information and new questions. Reserve K-12 education programs, community education programs, and CTP have focused on communicating the science of nitrogen pollution to the public and are focusing on what people can do as citizens or as decision makers to be a part of developing or implementing the solution. Integrated work by staff at the reserve is addressing a locally important coastal management issue that contributes directly to the national priorities of the system. To learn more, visit *www.waquoitbayreserve.org*.

- What are the expectations, mandates, and important goals of the state partner?
- What are the critical ongoing/existing local estuarine environmental issues that are not covered by the partner goals?
- What are the local emerging issues or threats that are likely to become increasingly important in the next five years?
- What science, education, training, stewardship, or leadership is needed to address the most pressing local issues relevant to the reserve?
- Who else is working on these issues near the reserve?
- What are the working relationships with key state programs such as the coastal management program on these issues?
- What topics and functions are appropriate for the reserve to work on, given staff strengths, limitations or constraints, infrastructure, resources, and state partner priorities?

The Reserve System Strategic Plan focuses its core strengths of research, stewardship, education, and training on three national priorities – climate change, habitat protection, and water quality. Because of the state-federal partnership inherent to the Reserve System, management plans must articulate both how reserves address local coastal management issues and how local work also contributes to the national system.

Nationally, the Reserve System is working toward all of the objectives stated in the strategic plan. Some objectives will be achieved through coordinated national programs, like the System-Wide Monitoring Program. Others represent a collective vision for the work individual reserves do, such as implementing research projects that use reserves as sentinel sites for detecting and understanding the effects of climate on estuaries. It is unlikely that an individual reserve will address all of the objectives in the Reserve System Strategic Plan, but it is expected that a significant portion of the reserve's work contributes to the system-wide goals and objectives. The following questions will help reserves align their plan to address goals and objectives within the Reserve System Strategic Plan:

- Which Reserve System Strategic Plan objectives and strategies can the reserve address?
- How is the reserve addressing climate change, water quality, and habitat issues? How are national programs like SWMP, CTP, GRFs, NSC, and KEEP contributing to filling the gaps, reducing stressors, and meeting the needs identified by the reserve? Could they better support local needs?
- What are the critical stressors, information needs or gaps, etc. related to habitat, water quality, and climate at your reserve? What is your role in addressing those gaps, both as a reserve and within your programs (research, education, training, etc.)?

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Resources

U.S. Fish and Wildlife Service Training at National Conservation Training Center Introduction to Structured Decision-making: Training that provides an introduction to structured decision-making in the context of natural resource management challenges. The training also provides hands-on experience with decision tools, decision trees, multiple objective ranking techniques and expert panels covering critical thinking, logic, and reasoning strategies. Adaptive Management: Structured Decision-Making for Recurrent Decisions: Training where adaptive management is framed within the context of structured decision-making, with an emphasis on information and tools to address uncertainty regarding responses to management actions and the value of reducing uncertainty to improve management.

Ecosystem-Based Management Tools Network provides focus questions, suggested reading, case studies, approaches, tools, and links to other core elements of ecosystem-based management tools.

Adaptive Management: A Tool for Conservation Practitioners provides steps in the process and principles of adaptive management

Adaptive Management Technical Guide provides a scoping key and focus questions for successful implementation.

Learning for Sustainability: Adaptive Management - Learning While Doing provides information, guides and selected readings on the use and application of adaptive management with uncertainty – including selections on adaptive management increasing resiliency to climate change.

Preparing to Write a Reserve Strategic Plan

Strategic Planning Process

Strategic planning is a systematic process to assess an organization's direction and priorities. A good strategic planning process requires time and effort to gather and analyze data and trends to set a baseline of understanding; assess target audiences related to all program areas; identify organizational niche and priority goals, objectives, and actions; implement actions to meet objectives; and monitor and evaluate progress towards meeting objectives.

To create an effective strategic plan that meets coastal management needs, reserves must understand the social, economic, political and cultural dynamics of the community in which the organization operates, and must engage all stakeholders.

The strategic planning pyramid below identifies the elements of strategic planning from the initial step of assessing the target population through the final step of implementing and evaluating progress. All staff should participate in each step of this process to create a sense of ownership of the plan, which ultimately leads to successful implementation.

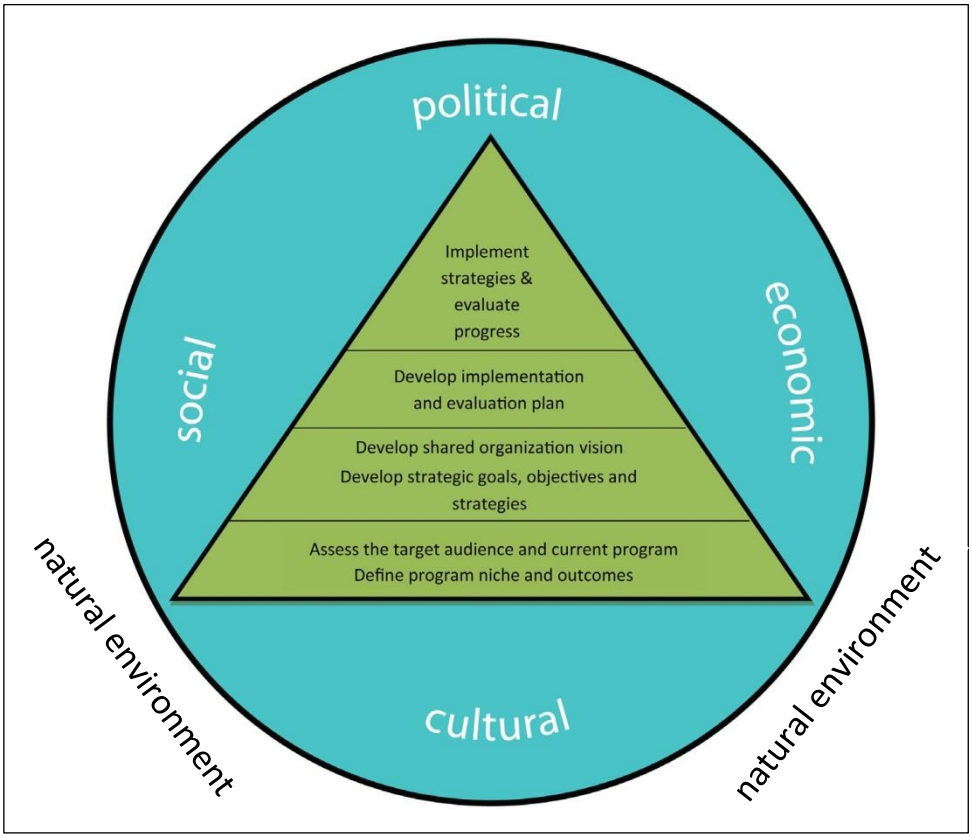


Figure 3. Strategic Planning Pyramid

Identifying Program Target Audiences

It is important to first identify the target audiences for a program's efforts. Target audiences may be within or outside the host agency and comprised of individuals who have the ability to influence and support the reserves' major resource issues. Each program at the reserve should assess their target audiences by understanding their skills and needs, as well as the activities and products currently employed to serve that audience. It is important to understand emerging issues and needs that these audience may need to address and/or influence. This step can be accomplished via formal needs assessments, focus groups, or surveys, etc. Note: The state coastal management program is a key partner in identifying audiences and an audience themselves.

Assessing Skills and Capacities of Reserve Programs

The next step should be to assess reserve program capacities because this will affect what can be accomplished. One way to approach this step is via a SWOT (strengths, weaknesses, opportunities, and threats) analysis. Programs can answer certain questions to provide information about program expertise, contributions to target audiences, trends, and resources the program may need in the future to be successful (Mind Tools, 2009). Questions to inform this analysis include:

Strengths: What are the reserve program's unique characteristics and resources? What does the target audience view as the program's main strengths? What trends can the program build on?

Weaknesses: What does the program lack that the target audience needs? What resources do reserve programs need to meet current target audience needs?

Opportunities: What could the reserve program offer that meets the needs of the target audience to effectively manage coastal resources? How are other programs addressing target audience needs?

Threats: Because of program weaknesses, what threatens reserve programs? What expertise do reserve programs lack to meet future target audience needs?

Figure 4. SWOT Chart

To complement this approach, NOAA has developed questions for each system-wide program to help identify strengths, weaknesses, and opportunities to then identify the niche for each program. Although the questions for each program are binned similarly and contain many of the same questions to provide consistency in approach, there are differences between the programs. And key documents for each program are suggested as references when considering these questions

A. Research and Monitoring Program

Priority Issues – What are the priority coastal management issues for your reserve that your research program can address? How did you identify them? Do they align with the broader issues being identified at your reserve for this plan? Do they align with the Reserve System Strategic Plan, SWMP plan, and other system-wide documents?

Priority Audiences – How does the research program currently support reserve, coastal management program, local community, and regional science priorities? Who are the target audiences that interact with and benefit from the research program? How were these audiences identified? What do you know about the skills, abilities, and current level of knowledge of the target audiences?

Program Alignment and Delivery – How have you or do you plan to adopt and adapt system-wide programs (e.g., biological monitoring and sentinel sites) to address the reserve's priority issues and reach target audiences? How does the research program support and align with system-wide plans and efforts (e.g., Climate Change Initiative Implementation Plan, SWMP Plan, Research and Monitoring Plan, Community Education efforts)? What major activities will the research program engage in that addresses the priority issues identified above, within the next 5 years? How does the research program coordinate with and build upon other programs/initiatives at the reserve and within the Reserve System (e.g., coastal training programs, education products or programs)?

Program Needs and Gaps – What are the major program needs and gaps that may or may not be addressed during the period of this management plan? How will these needs and gaps affect research programming and what are the consequent impacts to the research program?

Program Impacts – What are the major impacts and outcomes you envision as a result of research activities? How will human communities and natural ecosystems benefit from these activities? Current and Anticipated Partnerships - Who are your partners and why do you partner with them? Who do you hope to partner with in the future? Do you partner with NOAA offices? If so, please describe. If not currently partnering, are there opportunities to build partnerships?

Program Monitoring and Evaluation – How do you evaluate the success of your research program? What are your expected outcomes?

Dissemination of Program Results – How will you communicate program impacts and results? Please remember that the current Reserve System Research and Monitoring Database provides a mechanism for developing a library of research projects that can be shared. In this section, we are also interested in knowing about other mechanisms (e.g., conferences, journal publications, newsletters, social media, etc.) you can use to disseminate program results and information beyond the audiences immediately involved in the project.

Supporting Documents:

We recommend the following documents for guidance: 2011-2016 Reserve System Strategic Plan, Climate Change Implementation Plan, Research and Monitoring Plan, System-Wide Monitoring Program Plan, and Reserve System Sentinel Sites Program Guidance, Coastal Management Program Section 309 Assessment and Strategies.

B. Education Program

Priority Issues – What are the priority issues for your reserve that your education program can address? How did you determine them? Do they align with the broader issues identified at your reserve for this plan? Do they align with the Reserve System Strategic Plan, K-12 Estuary Education Program, Community Education Framework, NOAA Education Strategic Plan?

Program Context – What have you learned since the last management plan that has affected this plan? What have you learned, after completing a market analysis and needs assessment, which has affected this plan? What is your program's geographic scope?

Priority Audiences – Who are the target audiences that interact with and benefit from the education program? How were these audiences identified? What do you know about the skills, abilities, and current level of knowledge of the target audiences? Are underserved and underrepresented populations a target audience for your programs? What is the total population of the audience you plan to target? What percentage of that population do you plan to target within the next 5 years? What do you know in terms of (1) your current reach (number of counties, districts, and inland areas), (2) the areas you plan to target with your distinct programs and (3) why? Most reserves can characterize their education programs as one or several of the following program categories that serve different target audiences: professional development programs, student programs, public programs, outreach programs, and/or community education programs.

Program Alignment and Delivery – How have you or how do you plan to adopt and adapt system-wide programs to address the reserve's priority issues and reach target audiences? How does the education program support and align with system-wide plans and efforts (e.g., Climate Change Implementation Plan, SWMP Plan, Research and Monitoring Plan)? What major activities will you undertake that will address the priority issues you identified above within the next 5 years? What type of programming will you emphasize and why? (Type of programs: professional development programs, students programs, public programs, outreach programs, and/or community education programs). What methodologies do you plan to employ in your program? How do you work with and build upon other programs/initiatives at the reserve and within the Reserve System (e.g., specific reserve research products that are used)?

Program Needs and Gaps – What are the major program needs and gaps that may or may not be addressed during the period of this management plan? How will these needs and gaps affect potential programming and subsequent impacts? What education gaps are identified and required to address issues in the next 5 years?

Program Impacts – What are the major impacts and outcomes that will result from education activities? What will human and natural communities gain from these activities? What is the desired change in the target audience's behavior?

Current and Anticipated Partnerships – Who are your partners and why do you partner with them? Who do you hope to partner with in the future? Do you partner with NOAA offices? If so, please describe. If not, are there opportunities to build partnerships? We highly recommend outlining project partners such as curriculum coordinators, school principals, state science teacher associations, teachers, supervisors, department chairs, state science supervisors, as well as other key education administrators.

Program Monitoring and Evaluation – How do you evaluate your success? Have you developed a logic model for your program? Do you have an evaluation plan in place? What are your expected outcomes within the next 5 years?

Dissemination of Program Results – How do you plan to communicate program impacts and results? Please remember that the current Reserve System Performance Measure Database provides a mechanism for sharing your success stories and program results with other reserves. In this section, we are also interested in knowing about other mechanisms you have to disseminate your stories beyond the audience immediately involved in the activities of the project. Are you planning to present at local, regional, or national education conferences? If so, which ones? Do you have a newsletter? Do you use social media to communicate? Will you publish your results in a journal, and if so, which one(s)?

Other Considerations:

Guiding principles used in the design and implementation of reserve education programs:

- Educate audiences about estuaries holistically by including ecological, cultural, historical, and scientifically relevant facts and concepts;
- Promote a sense of stewardship and individual responsibility;
- Address coastal issues from a local, state, regional, national, and global perspective;
- Approach estuary education through a perspective that includes watersheds and biogeographic regions; and
- Increase understanding and appreciation of the Reserve System research conducted at reserves and the use of System-Wide Monitoring Program data.

Supporting Documents:

We recommend the following documents for guidance: 2011-2016 Reserve System Strategic Plan; K-12 Estuary Education Program (KEEP) Framework document; Teachers on the Estuary Program Description Community Education Framework Document; Education Sector Performance Measurement Guidance; and the NOAA Education Strategic Plan 2009- 2029. All approved Education Program Descriptions can be found on the Reserve System Intranet. Additional Reserve System guiding documents include the Climate Change Implementation Plan, System-Wide Monitoring Program Plan, Reserve System Sentinel Sites Program Guidance. Coastal Management reference documents include the Coastal Management Program Section 309 Assessment and Strategies.

C. Coastal Training Program

The CTP Program Strategy should provide much of the material for this section, especially if the Program Strategy was developed in an integrated manner with other reserve programs and assets.

Priority Issues – What are the priority issues for your reserve that your Coastal Training Program can address? How did you determine them? Do they align with the broader issues identified within the management plan and the Reserve System Strategic Plan?

Program Context –What have you learned since the last management plan that has affected your plan? What have you learned that has affected your ideas for this plan after completing a market analysis and needs assessment? What is the geographic scope for the program and why is this scope identified?

Priority Audiences – Who are the target audiences that interact with and benefit from the CTP? How were these audiences identified? What are the skills, abilities, and current level of knowledge of the target audiences?

Program Alignment and Delivery – How does the CTP support and align with system-wide plans and efforts (e.g. Climate Change Implementation Plan, SWMP Plan, Research and Monitoring Plan, Community Education) What major activities will you undertake that will address the priority issues you've identified within the next 5 years? What methodologies do you plan to employ in your training? How do you work with and build upon other programs/ initiatives at the reserve and within the Reserve System (e.g., specific reserve research programs or products)?

Program Impacts – What are the major impacts and outcomes you anticipate resulting from training activities? What will human communities and natural ecosystems gain from these activities? What is the desired change in the target audience's behavior?

Program Needs and Gaps – What are the major program needs and gaps that may or may not be able to be addressed during the period of this management plan? How will these needs and gaps affect potential programming and subsequent impacts? What training gaps are identified and required to address issues in the next 5 years?

Current and Anticipated Partnerships – Who are your partners and why do you partner with them? Who do you hope to partner with in the future? Do you partner with NOAA offices? If not, how might you build better partnerships in the future?

Program Monitoring and Evaluation – How do you evaluate the success of your CTP? Have you developed a logic model for your program? What are your expected outcomes?

Dissemination of Program Results – How do you plan to communicate program impacts and results? Please remember that the current Reserve System Performance Measure Database provides you a method by which you can share your success stories and program results with other reserves. In this section, we are also interested in knowing what other mechanisms you have to disseminate your stories beyond the audience immediately involved in the activities of the project. Are you planning to present at local, regional, or national conferences? If so, which ones? Do you have a newsletter? Do you use social media to communicate? Will you publish results in a journal? If so, which ones?

Supporting Documents:

We recommend the following documents: 2011-2016 Reserve System Strategic Plan, Climate Change Implementation Plan, System-Wide Monitoring Program Plan, and Reserve System Sentinel Sites Program Guidance, and Coastal Management Program Section 309 Assessment and Strategies. All approved CTP Program Strategies can be found on the Reserve System Intranet.

Developing Reserve Program Niches

Assessing the information above allows each program to develop their niche, which is the intersection where the capabilities and activities of the program are uniquely suited to meet the needs of the target audience (Figure 5). This information should be shared with all reserve staff, ideally in a meeting where all programs are represented and can discuss how they can work together collectively.

Reserve Niche

The unique suite of functions the reserve provides to meet target audience needs that are not met by others.

A. Where's Stewardship?

Due to the complexity and variability of the ways that stewardship programs are focused and operated at each reserve, this program has not been identified as system-wide program with a specific program niche as identified for research, education and coastal training. Stewardship functions are included in the research and monitoring, resource protection, public access, and land acquisition components, as well as in the optional restoration and resource manipulation components of a management plan. The skills and assets of the stewardship staff are applicable and inter-related to all other components of reserve management. Figure 1, Relationship of Reserve Management Plan Components, illustrates how the functions of stewardship are manifested in the planning paradigm. Reserves should answer similar questions for the stewardship program as those asked for research and monitoring, education, and training.

B. What about Other Programs?

This guidance only focuses on the system-wide programs for the Reserve System. While there are several other programs at the reserve that will contribute to this strategic planning process, NOAA is only providing thought questions for those programs with consistent processes, protocols and evaluation mechanisms. It is strongly advised that additional programs ask similar questions to determine the program niche. The approach should be appropriate and flexible for each reserve's structure.

C. Developing the Reserve Niche

When each program understands their niche, the reserve can integrate the characteristics of these niches to develop the niche of the reserve. The program's combined efforts meet the needs of a wider, more complete target audience. It is important to understand the unique role that the reserve will play in meeting target audience needs, as there may be several local providers offering similar products and services. It is beneficial to either partner with other organizations, or to focus unique skills and services of the reserve on meeting specific target audience needs.

Questions to inform niche development include:

What will the target audiences needs be in the future? Which target audience needs can be filled by other organizations? Based on program strengths, which needs can the programs best meet? What are the unique products and services the reserve offers that the target audiences cannot get elsewhere?

Figure 5. Organization Niche

Developing Shared Vision and Mission Statements and Goals, Objectives and Actions

Once a niche is determined, the reserve will develop a shared vision, mission, goals, objectives and actions, culminating into the strategic plan. This is further discussed in Part II in the Strategic Plan element.

Part II: Components of the Reserve Management Plan

Part II provides specific guidance for developing each component of a reserve management plan. Each section also provides supporting references, resources, and case studies to help illustrate the content required for that component. Each section contains a checklist of required and optional elements (indicated by ♦) and questions to help develop those elements.

Required components, and elements within components, may be organized to suit the reserve's needs. All required elements must be included in the plan and follow a logical order so that they can be easily identified and understood. The questions provided in each section are meant to guide development of the plan. Some may be easy to answer while others may prove more challenging. Reserves should address as many of these questions as possible.

Elements within the "Program Foundations" component (i.e., Research and Monitoring, Education, and Training) may be organized in one chapter or included as separate chapters. The strategic plan should clearly identify which sector is leading an action, and it is also suggested that a sector be identified to lead each objective, coordinate multi-sector actions, and evaluate progress. Reserves may decide how information within the strategic plan and Program Foundations element is organized.

Required and Optional Elements Checklist

♦ indicates an optional element

Executive Summary

__ Plan purpose and scope
__ Reserve context
  __ Designation date and acreage
  __ State agency
  __ Location of reserve
  __ Boundary modification (if applicable)
__ Priority coastal management issues
__ Reserve niche and goals
__ Reserve programs Overview

Introduction to Reserve System

__ Mandatory Text

Introduction to the Reserve

__ History and local management
__ Ecological attributes
  __ Geomorphology
  __ Hydrology
  __ Climate and weather
  __ Key habitats and species
__ Social attributes
  __ Population demographics
  __ Jobs and employment trends ♦
  __ Ecosystem services ♦
__ Archaeological and cultural resources ♦
  __ Archaeological sites ♦
  __ Cultural sites or resources ♦
  __ Value of resources ♦
__ Threats and stressors
  __ Natural and anthropogenic stressors
  __ Climate phenomena and impacts
  __ Reserve sensitivity to impacts ♦
  __ Reserve vulnerability ♦
__ Boundary description
  __ Core and buffer rationale
  __ Boundary map
  __ Core and buffer
  __ Land ownership
  __ Habitat types
  __ Land use type
  __ Targeted watershed map including land use and land cover
  __ Boundary expansion rationale and GIS layers (if applicable)

Reserve Strategic Plan

__ Vision
__ Mission
__ Priority coastal management issues
__ Goals, objectives, and actions
__ Performance measures for each objective ♦

Program Foundations

<u>Research and Monitoring Program</u>

__ Mandatory system-wide text
__ Program context, capacities, and delivery
__ Needs and opportunities
__ Research related objectives and actions♦
__ Monitoring and evaluation strategies♦

<u>Education Program</u>

__ Mandatory system-wide text
__ Program context, capacities, and delivery
__ Needs and opportunities
__ Education related objectives and actions♦
__ Monitoring and evaluation strategies♦

<u>Coastal Training Program</u>

__ Mandatory system-wide text
__ Program context, capacities, and delivery
__ Needs and opportunities
__ Training related objectives and actions♦
__ Monitoring and evaluation strategies♦

Administrative Plan

__ Organizational framework
__ Current staffing and needs
__ Strategic partnerships
__ Advisory committees
__ Administrative objectives and actions
__ Volunteer plan ♦
__ Vessel and vehicle plan ♦
__ Communication plan ♦

Resource Protection Plan

__ Management authorities
__ Allowable and unallowable uses
__ Map of allowable uses
__ Surveillance and enforcement capacities
__ Resource protection challenges
__ Resource protection objectives and actions♦
__ Monitoring and evaluation strategies ♦

Public Access and Visitor Use Plan

__ Current public access
__ Map of public access points
__ Public access challenges
__ Public access and visitor experience opportunities
__ Public access objectives and actions♦
__ Monitoring and evaluation strategies♦

Facility Development and Improvement Plan

__ Purpose of facilities
__ Current facilities
__ Map of facility locations
__ Facility challenges and gaps
__ Planned facilities, facility upgrades, and exhibits
__ Climate and non-climate stressors
__ Facility descriptions
__ Operations and maintenance manual as appendix ♦
__ Long-term facility plan as appendix ♦

Land Acquisition Plan

__ Reserve acquisition values ♦
__ Priority acquisition areas
__ Description of acquisition areas
__ Map of acquisition areas
__ Prioritization process ♦
__ Climate and non-climate stressors
__ Map of non-ecological acquisition values within priority areas ♦
__ Priority areas acquisition strategy
__ Tract acquisition strategy
__ Tract ecological and/or programmatic values
__ Preferred methods for establishing state control
__ Fair market value estimates
__ Potential acquisition partners♦
__ Funding sources ♦
__ Estimated acquisition timeline
__ Map detailing land uses on public and private tracts outside the reserve boundaries ♦
__ Management and/or stewardship considerations for acquisition priorities ♦
__ Description of collaborative process used in joint acquisition projects ♦

Resource Manipulation Plan (if applicable)

__ Current and proposed resource manipulation activities
__ Map of manipulation activities
__ Permitting/approval requirements
__ Climate and non-climate stressors
__ Current and potential partners
__ Impacts of activities
__ Monitoring and evaluation strategies ♦

Restoration Plan (if applicable)

__ Priority restoration areas
__ Description of restoration areas/habitats
__ Map of restoration areas
__ Climate and non-climate stressors
__ Prioritization process and criteria
__ Priority restoration projects
__ Acres and outcomes
__ Partners
__ Monitoring and evaluation strategies ♦

Executive Summary

About This Section

The executive summary should provide an overview of the plan, and must identify all elements as stated in the Federal Code of Regulations 15 CFR 921.13. It should define the purpose and scope of the plan, describe reserve context, identify priority coastal zone management issues that the reserve will address, and provide an overview of the goals and objectives, as well as indicate the programs that will be used to address the goals and objectives.

Plan Contents

A. Plan Purpose and Scope

This section should illustrate the purpose and scope of the plan and provide the national and local context for the plan. This section should outline:

- The lifespan and geographic scope of the plan
- The priorities, general approach, and how the reserve will measure progress
- The intersection with state, regional, and local partner goals, plans, and programs

B. Reserve Context

This section should describe reserve location and administrative structure to provide a sense of place and context for reserve work. This section should outline:

- Reserve designation date, acreage, general location, and lead state agency
- Primary influences on the reserve (see Figure 3)
- Reserve's role in addressing coastal management issues and context within system
- Expansion, if applicable, including acres added, where it will be added, value of the addition, and the total acreage of the reserve after the boundary expansion

C. Coastal Management Issues and Reserve Goals

This section should outline the priority coastal management issues the reserve is addressing, as well as identify the reserve's niche and goals.

D. Reserve Programs Overview

This section should provide a brief overview of reserve programs and how they will broadly contribute and coordinate to achieve the goals. (See Figure 1, page 4)

Executive Summary

__ Plan purpose and scope
__ Reserve context
__ Designation date and acreage
__ State agency
__ Location of reserve
__ Boundary modification (if applicable)
__ Priority coastal management issues
__ Reserve niche and goals
__ Reserve programs overview

Introduction to the National Estuarine Research Reserve System

About This Section

The following text should be included verbatim in the management plan to ensure that all reserves are consistently describing the framework for the Reserve System. This section includes information about the goals of the Reserve System, how reserves are designated and described, and how they work administratively as single units and as a system.

Plan Contents

This section contains mandatory text which must be used verbatim in the plan to ensure a level of consistency when discussing the Reserve System.

(Mandatory text begin)

Introduction to the National Estuarine Research Reserve System

The National Estuarine Reserve System was created by the Coastal Zone Management Act of 1972, as amended, to augment the National Coastal Zone Management Program which is dedicated to comprehensive, sustainable management of the nation's coasts.

The Reserve System is a network of protected areas representative of the various biogeographic regions and estuarine types in the United States. Reserves are established for long-term research, education and interpretation to promote informed management of the Nation's estuaries and coastal habitats. (15 C.F.R. Part 921.1(a)) The Reserve System currently consists of 28 reserves in 23 states and territories, protecting over one million acres of estuarine lands and waters (Figure 6).

The Reserve System is a partnership program between the National Oceanic and Atmospheric Administration (NOAA) and the coastal states. NOAA provides funding, national guidance and technical assistance. The state partner manages reserve resources on daily basis working collaboratively with local and regional partners.

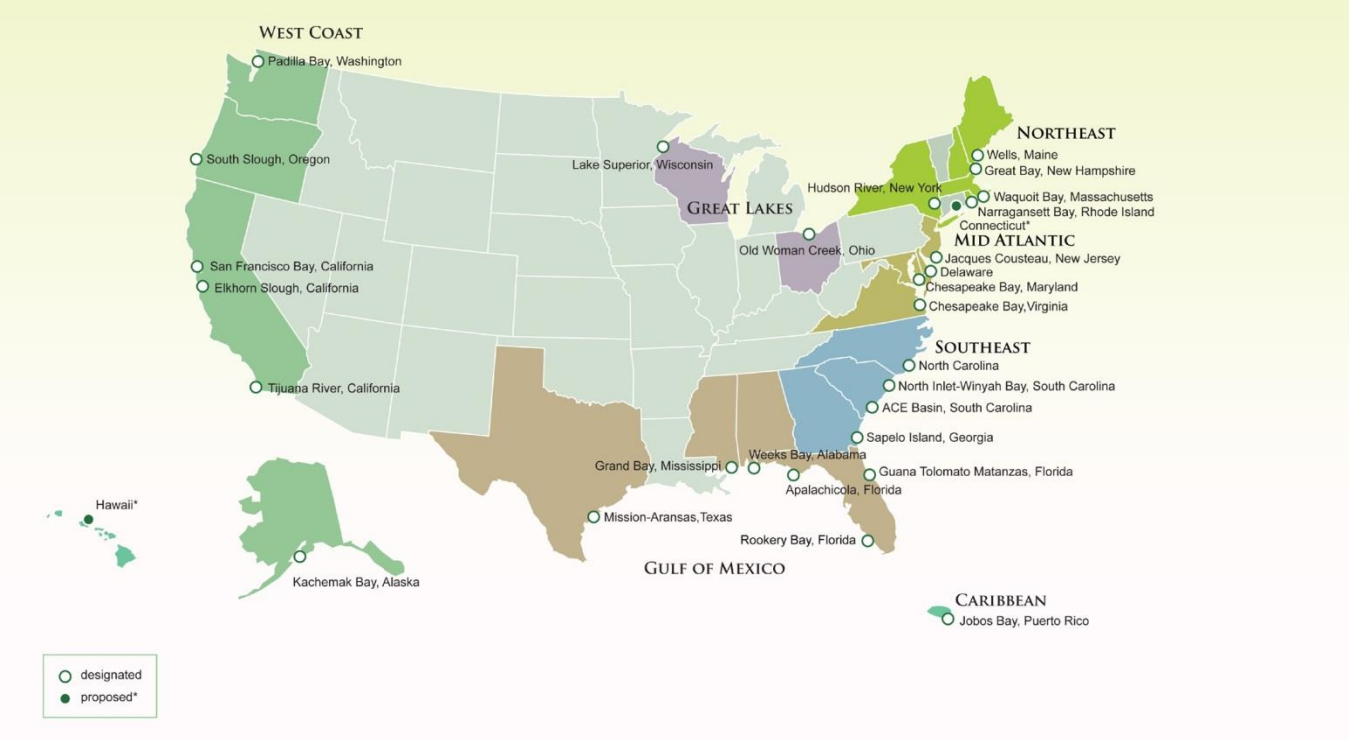


Figure 6. National Estuarine Research Reserve System Map

National Estuarine Research Reserve System Strategic Goals

Estuaries are biologically rich, economically valuable, and highly vulnerable ecosystems. The vision and mission of the Reserve System reflect the importance of these systems within our communities.

Vision: Resilient estuaries and coastal watersheds where human and natural communities thrive.
Mission: To practice and promote stewardship of coasts and estuaries through innovative research, education, and training using a place-based system of protected areas.

The program goals, per Federal regulations 15 C.F.R. Part 921.1(b), outline five specific goals for the Reserve System:

1. Ensure a stable environment for research through long-term protection of National Estuarine Research Reserve resources;
2. Address coastal management issues identified as significant through coordinated estuarine research within the system;
3. Enhance public awareness and understanding of estuarine areas and provide suitable opportunities for public education and interpretation;
4. Promote Federal, state, public and private use of one or more Reserves within the System when such entities conduct estuarine research; and
5. Conduct and coordinate estuarine research within the system, gathering and making available information necessary for improved understanding and management of estuarine areas.

These foundational goals are complemented by those that are systematically set by the program every five years. Strategic planning has been an integral part of the National Estuarine Research Reserve System for nearly twenty years. The planning process is designed to bridge national program direction with local coastal management needs through a representative and participatory process that supports NOAA's mission of science, service, and stewardship. The 2011-2016 Reserve System Strategic Plan focuses reserve core strengths of research, education, and training on three core issues: climate change, habitat protection, and water quality. The Reserve System Strategic Plan Goals are:

1. **Protected Places**: Estuaries and coastal watersheds are better protected and managed by implementing place-based approaches at reserves.

2. **Science**: National Estuarine Research Reserve System scientific investigations improve understanding and inform decisions affecting estuaries and coastal watersheds.

3. **People**: National Estuarine Research Reserve System education and training increases participants' environmental literacy and ability to make science-based decisions related to estuaries and coastal watersheds.

Biogeographic Regions and Boundaries of the National Estuarine Research Reserve System

NOAA has identified eleven distinct biogeographic regions and 29 subregions in the United States, each of which contains several types of estuarine ecosystems (15 C.F.R. Part 921, Appendix I and II). When complete, the Reserve System will contain examples of estuarine hydrologic and biological types characteristic of each biogeographic region. As of 2012, the Reserve System includes 28 reserves and two states in the process of designating a reserve.

Reserve boundary size will vary greatly depending on the nature of the ecosystem. Boundaries must include an adequate portion of the key land and water areas of the natural system to approximate an ecological unit and to ensure effective conservation. Reserve boundaries encompass areas for which adequate state control has or will be established by the managing entity over human activities occurring within the reserve. Reserve boundaries include a "core" area which is comprised of key land and water encompassing resources representative of the total ecosystem, which if compromised could endanger the research objectives of the reserve, as well as a "buffer" area designed to protect the core area and provide additional protection for estuarine-dependent species, including those that are rare or endangered. Buffer areas may also include areas necessary for facilities required for research and interpretation. Additionally, buffer areas are identified to accommodate a shift of the core area as a result of biological, ecological or geo-morphological change which reasonably could be expected to occur. (15 C.F.R. Part 921.11 (c)(3))

National Estuarine Research Reserve Administrative Framework

The process for federal designation of a National Estuarine Research Reserve has many steps and involves many individuals and organizations. While each reserve is a partnership program between NOAA and a coastal state, there are many entities that collaborate to support designation of a reserve. Other partners include federal and state agencies, non-profit groups, universities and members of the local community. For more information on the designation process see nerrs.noaa.gov/background.

Upon designation, the reserve implements the approved management plan and is eligible for NOAA financial assistance on a cost-share basis with the state. A reserve may apply to NOAA for funds to help support implementation of the management plan largely funding operations, research, monitoring, education/interpretation, training, stewardship, development projects, facility construction, and land acquisition. Management plans provide a vision and framework to guide reserve activities during a five year period and enable the reserves and NOAA to track progress and realize opportunities for growth. Each management plan contains the reserve goals, objectives, and strategies supported by programs focused on research and monitoring, education and outreach, training, and stewardship. They also outline administration, public access, land acquisition and facility plans and needs, as well as restoration and resource manipulation plans, if applicable. Reserves are increasingly confronted with complex questions regarding new uses in or near reserves that may or may not be compatible with the Reserve System's mission. A thoughtful and comprehensive management plan provides a foundation for addressing these challenges to protect and manage reserve resources wisely and ensure the public and coastal decision makers value and protect coastal resources.

NOAA administers the Reserve System and establishes standards for designating and operating reserves, provides support for reserve operations and system-wide programming, undertakes projects that benefit the Reserve System, and integrates information from individual reserves and programs to support decision-making at the national level. Additionally, NOAA periodically evaluates reserves for compliance with federal requirements and with the individual reserve's federally approved management plan, as mandated under Section 312 of the Coastal Zone Management Act (15 C.F.R. Part 921.40).

NOAA currently provides leadership and support for three system-wide programs including the System-Wide Monitoring Program, the K-12 Estuarine Education Program, and the Coastal Training Program, as well as the NERRS Science Collaborative. They also provide support for initiatives focused on the Reserve System's priorities: climate change, water quality and habitat protection.

(Mandatory Text End)

Introduction to the Reserve

About This Section

It is important that reserves are managed with an understanding of how the three sectors of influence intersect and impact coastal resources (Figure 7). It is important to provide context for reserve strategic actions by providing information about reserve ecosystems (ecological attributes) and reserve communities and economies (social attributes and cultural resources), as well as geographic and administrative context for the reserve. It is imperative to understand the inextricable link between natural resources and humans as it greatly influences program management and decision-making.

By understanding the human context, we can better understand relationships between humans and natural resources and in turn use this information to develop a robust strategic plan.

It will also be important to understand threats and stressors facing the reserves and how these stressors may impact or alter these sectors and hence influence strategic planning and implementation of the plan.

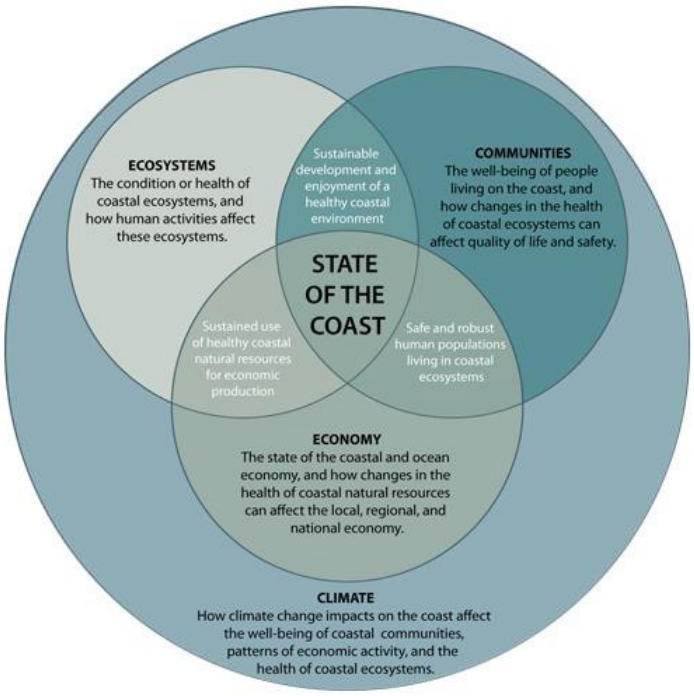


Figure 7. State of the Coast

The purpose of this section is to provide:

- Overview of history of reserve designation and general administrative structure;
- General and brief description of the reserve's ecological and social attributes to provide context for the plan;
- Description of climate and climate impacts to the extent possible; and
- Description of the reserve boundary, adjacent influences, and boundary expansion (if applicable).

Plan Contents

A. History and Local Management of the Reserve

This section should describe the impetus for and parties involved in the designation, as well as brief overview of process and rationale used to designate lands included within the reserve. It should also describe the lands identified for protected status and any acquisitions made specifically during the designation process. This section should also include the general management structure for the reserve, the state agency and department responsible for management, and the relevant land management partners.

B. Ecological Characteristics

The description of the natural setting should provide a general overview of the location and extent of key physical and environmental characteristics of the reserve including geography, geology, hydrology, biological resources, climate, and weather. This information should be a very brief synopsis of the reserve's ecological characterization as described in the site profile. A link to the site profile can then be provided for more detailed information.

Geography and geology includes general description of the topography and geomorphology that creates the unique reserve ecosystem, as well as geological setting and classification. Hydrology should be characterized by the average tidal conditions the reserve experiences, the major inputs of fresh and salt water to the estuary, and any water quality or quantity issues potentially affecting the reserve. The reserve's climate and weather should be characterized by the climate regime the estuary is situated in, key weather patterns (e.g., El Niño, hurricanes) that may influence the reserve, and weather trends the reserve experiences. Trends can be gathered from reserve SWMP data and may include average annual minimum and maximum air temperature range and average annual rain fall. The reserve's key habitats, based on the Reserve System habitat classification scheme, should be described.

Introduction to the Reserve

♦ = optional element

__ History and local management
__ Ecological attributes
  __ Geomorphology
  __ Hydrology
  __ Climate and weather
  __ Key habitats and species
__ Social attributes
  __ Population demographics
  __ Jobs and employment trends ♦
  __ Value of ecosystem services ♦
__ Archaeological and cultural resources ♦
  __ Archaeological sites ♦
  __ Cultural sites or resources♦
  __ Value of resources♦
__ Threats and Stressors
  __ Natural and anthropogenic
  __ Climate phenomena and impacts
  __ Reserve sensitivity to impacts ♦
  __ Reserve vulnerability ♦
__ Boundary description
  __ Core and buffer rationale
  __ Boundary map
  __ Core and buffer
  __ Land ownership
  __ Habitat types (include map)
  __ Land use type (include map)
  __ Targeted watershed (include map that indicates land use and type)
  __ Boundary expansion rationale and GIS layers (if applicable)

A map should be included that identifies the habitats within the reserve boundary, as well as the targeted watershed. The reserve many also identify the most common and/or dominant animal and plant species in, as well as key species of importance or concern, including those that may be endangered or threatened.

C. Social Attributes

Understanding the social framework within and adjacent to the reserve will inform management of coastal resources and protect the reserve. An understanding of the social framework within the reserve's targeted watershed or defined geographic area of interest should include a brief description of population demographics. Additional information includes employment trends and social vulnerabilities, such as large populations of aged or low income residents. Population demographics can be characterized by population density, age, gender, ethnicity, education level and housing information. Ocean and coastal related jobs can be described by reviewing jobs by sector and job trends which are integrally related to gross domestic product for the area.

D. Archaeological and Cultural Resources

In addition to biological and social resources, the reserve may contain archaeological, cultural and historical resources that provide information and research opportunities about past settlements. These resources provide a sense of place and historical context and should be identified and preserved.

If the reserve includes this section, it should provide a brief overview and description for the archaeological and cultural resources within the reserve, including the value and general location of these resources. If an evaluation of these resources has been done, please include information about priority sites and any efforts to protect them. Collaboration with the state archaeologist or State Historic Preservation Office and state maritime archaeologist is recommended, if one exists.

E. Threats and Stressors

While reserves were designated under the premise that they are relatively pristine, representative estuarine ecosystems, they are and will likely be increasingly exposed to human and environmental stressors that must be understood in order to manage and adapt to changing conditions. This section should describe the primary stressors on the reserve.

1. Natural and Anthropogenic Stressors

Natural and anthropogenic threats and stressors affect all reserve environments. Each reserve is subject to different stressors depending on their geographic location and relationship to urban and rural communities, as well as exposure to weather and climate-related hazards. This section should address threats to both biological and social resources within and adjacent to the reserve. Threats such as sedimentation, nonpoint source pollution, invasive species, population growth, episodic storm events, flood exposure, etc. all provide unique challenges and should be described thoroughly to provide background and focus for the reserve's strategic plan.

2. Climate Change Impacts

Coastal societies and ecosystems are dependent upon unique resources and subject to hazards that inland landscapes may not be exposed to. Understanding these dependencies and threats is critical to management of these systems. Climate change stressors interact with other stressors within natural and social systems, and may alter their effects.

This section should provide an overview of any expected climate change impacts the reserve may face, as well as an overview of results and products from efforts to understand the current and projected impacts of climate change on the natural and social landscape of the reserve. For general information on climate stressors and expected changes and impacts that may result, please see *Appendix 6 Summary of Climate Change Phenomena with Observed and Projected Changes* and *Appendix 7 Summary of Observed and Projected Regional Climate-related Changes.*

Reserves should use available data, see "Resources" section below, to support this section, and are encouraged to mine local data and information sources to further augment this description. Per the resources below, reserves should describe flood exposure and assess impacts to human and ecological communities, as well as infrastructure within the flood zone. Reserves should assess land cover changes, and associated flood exposure, within the floodplain, as well as the risk and impacts of natural disasters on reserve resources.

3. Reserve Sensitivity and Vulnerability to Climate Change

As we try to understand and plan for the impacts of climate change on natural resources and communities, it is important to be aware of the general sensitivity, exposure, and adaptive capacity of our natural resources and the communities that depend on them. The Intergovernmental Panel on Climate Change defines vulnerability as a function of the sensitivity of a system to climate changes, its exposure to those changes, The Reserve System Climate Change Implementation Plan (CCIP) objective 'NERRS assess community and ecological sensitivity and vulnerability to climate change' sets a course for more than half of the reserves in the System to understand vulnerability assessment methods by 2015, and to apply those to assess the ecological and

Not considering climate change in management is akin to traveling in unknown territory without a map—one is not likely to arrive at the desired destination.

– *Scanning the Conservation Horizon*

social vulnerabilities of reserve ecosystems and communities. Additionally, the report *Climate Sensitivity of the National Estuarine Research Reserve System* (see Appendix 8), which explores the biophysical and social sensitivity of reserves and related communities, provides a resource for in-depth vulnerability assessments.

Ecological and Social Sensitivity

If reserves have not conducted a comprehensive vulnerability assessment of ecosystems and communities, existing data and information that describes natural resource sensitivity and exposure within the reserve should be included, as feasible. The Reserve System's Climate Sensitivity report noted above should be a resource for this data. The climate sensitivity report analyzes existing SWMP and national census data to determine relative reserve ecosystem and social sensitivity to climate change stressors across the Reserve System.

SWMP water quality data were analyzed in the climate sensitivity report to determine their relative responses to climate stressors such as precipitation and sea level rise. SWMP data analysis in the report indicates that there is temporal and spatial variability in reserve responses to climate stressors such as precipitation. This report can help reserves understand how sensitive their reserve is to climate stressors relative to other reserves in the region and country.

From a social perspective, a modified Social Vulnerability Index (SOVI) was used to determine relative sensitivity of reserves to climate impacts based on the geographic area of interest defined by each reserve. By better understanding current social sensitivity and trends, reserves can develop targeted research and education activities to promote resilient communities.

For general information on reserve sensitivity, please refer to the report in Appendix 8, *Climate Sensitivity of the National Estuarine Research Reserve System*.

Reserve Vulnerability

For those reserves that have completed and/or will complete a vulnerability assessment prior to the revision of their management plan, we encourage including a summary of the assessment. Reserves with the capacity to do so are encouraged to conduct a vulnerability assessment prior to updating the management plan, as it will affect the scope and scale of research, education and stewardship activities. For more information about the general process for conducting a vulnerability assessment, please see Appendix 9 Conducting a Reserve Vulnerability Assessment. If a vulnerability assessment cannot be done prior to revising the management plan, it is advisable to identify this effort within the strategic plan if feasible.

F. Reserve Boundary

This section should describe the reserve in the context of the state, region, and watershed. The reserve should identify the type of estuary it is (e.g. coastal plain, bar-built, deltaic system, tectonic, fjord) and the major physical attributes that define the reserve.

1. Core and Buffer

The boundary should be clearly defined and a description of how core and buffer areas were determined should be included. Adequate control, by the managing entities, over human activities occurring within all areas of the reserve boundary must be established. (15 CFR(c)(3)) Reserve boundaries will encompass two areas: key land and water or core zone, and a buffer zone. These different areas will likely require differing levels of control.

Core designated areas must be "vital to the functioning of the estuarine ecosystem that it must be under a level of control sufficient to ensure the long-term viability of the reserve or research on natural processes." Key land and water areas, which comprise the core area, are those ecological units of a natural estuarine system which preserve, for research purposes, a full range of significant physical, chemical and biological factors contributing to the diversity of fauna, flora and natural processes occurring within the estuary. The determination of which land and water areas are ''key'' to a particular reserve must be based on specific scientific knowledge of the area. A basic principle to follow when deciding upon key land and water areas is that they should encompass resources representative of the total ecosystem, and which if compromised could endanger the research objectives of the Reserve. Buffer zones protect the core area and provide additional protection for estuarine-dependent species, including those that are rare or endangered. When determined appropriate by the state and approved by NOAA, the buffer zone may also include an area necessary for facilities required for research and interpretation. Additionally, buffer zones should be established sufficient to accommodate a shift of the core area as a result of biological, ecological or geomorphologic change which reasonably could be expected to occur.

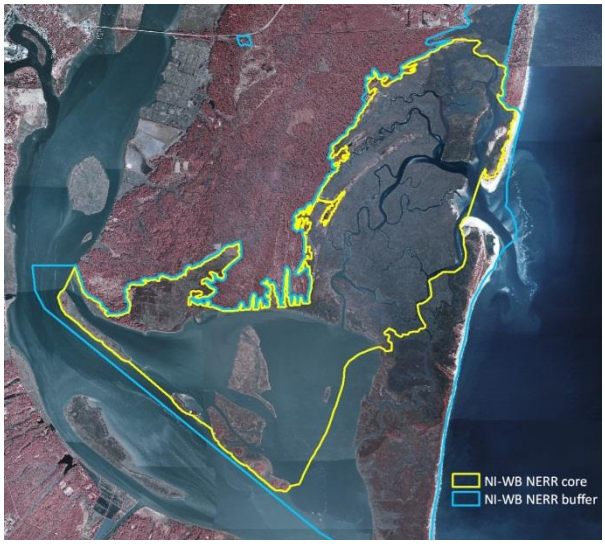


Figure 8. North Inlet-Winyah Bay Core and Buffer

In order to objectively and systematically delineate these areas 'within' reserve boundaries, the step-wise review of the data layers was derived by a NERRS workgroup and may help reserves define these areas. These areas may shift over time and should be reviewed and validated as appropriate and when reserves will be adding land to the boundary.

1. Habitat types that comprise the "estuarine system" (core) versus "non-estuarine system" (buffer).
2. Levels/types of control/protection status. For example, those areas with state and federal protection, preserve or refuge, would provide higher level of protection which should be afforded in core areas.
3. Public trust areas.
4. Potential areas of impact from climate change to help understand potential shifts of core and subsequently, buffer.

2. Land Ownership and Type

Land ownership and land use type should be described for all areas within the boundary. The number of acres should be attributed to each land owner. Federal lands already in protected status may not comprise a majority of the key land and water areas of a reserve, per 15 CFR 921.1(g). Land use adjacent to the reserve should also be identified with description of potential impacts and challenges. A map should be included that identifies land ownership within and adjacent to the reserve boundary.

3. Boundary Modifications

If a reserve plans to expand the boundary, they should propose to do so at the time of their management plan revision. While a boundary can be expanded outside of this process, it is not recommended unless circumstances necessitate this.

Reserves may expand their boundary to include those lands and/or waters that are necessary to protect the ecological units of the natural estuarine system for research purposes. Areas adjacent to these key land/waters that are essential to maintain the integrity of the ecological unit may also be incorporated into the boundary. An important consideration is the potential for habitat migration due to climate change. The lands/waters identified for inclusion in the boundary must either be contiguous to the original boundary or the plan must demonstrate how these areas are necessary for reserve research and/or education programs. Additions should not be proposed for inclusion until they meet the criteria below:

1. Boundary should encompass an adequate portion of the key land and water areas of the natural system to approximate an ecological unit
2. Adequate state control of the site(s) must be established
3. Site should be suitable for long-term research and be important for education and interpretive efforts.

Reserves are also encouraged to factor climate change impacts, (e.g. potential habitat and species migrations) into boundary modification decisions.

The reserve must include the following if proposing to modify the boundary:

- Describe the proposed lands to be added or deleted by defining the location, acres, habitats, and existing uses. State the total acreage of the new boundary, after explaining why lands and/or waters are proposed for addition or deletion.
- Provide a map depicting original boundary and new (expansion or contraction) boundary
- Provide a brief history of the additional lands (if expanding)
- Provide the rationale for expansion – the benefits these lands and/or waters provide to the reserve from an ecological and/or programmatic perspective.
- Depict core and buffer on the new boundary map
- Identify land ownership and type on the new boundary map
- Identify how lands will be managed and the responsible parties for management
- Identify how lands will be used, e.g. value to program efforts, public access, etc.

Additionally, an MOU must be drafted between the state agency and the land managing partners, if different from the state agency, to affirm that the lands will be managed in accordance with Reserve System regulations. The MOU must be included as part of the management plan revision in an appendix.

Please note that GIS layers for boundary additions should be submitted to NOAA so that Coastal Change Analysis Program data can be updated.

Resources

Natural Data Sources

Benthic Cover data provides nearshore benthic habitat polygons derived from aerial optic or swath acoustic imagery as part of NOAA's Digital Coast.

Coastal Change Analysis Program (C-CAP) data is a source of coastal land cover and change information, including inventories of intertidal areas, wetlands, and adjacent uplands, for use in GIS. Also see the C-CAP Land Cover Atlas to explore the data on-line and print summary data sheets.

Coastal Lidar provides data sets contributed by many different entities and groups, distributed in user-specified formats, resolutions, and datums as part of NOAA's Digital Coast. Also see the Topobathy Data Inventory to see where high-resolution elevation data is available for coastal and marine areas.

Data.gov provides geospatial data from several federal agencies applicable to understanding coastal biophysical landscapes.

National Estuarine Research Reserve Site Profiles characterize the environmental features, habitat types, species distribution, biological communities and current research available as well as research gaps for each reserve.

Climate Sensitivity of the National Estuarine Research Reserve System (also Appendix 8) is a report that explains the extent of relative climate sensitivity in the reserves by looking at five factors: social, biophysical, and ecological sensitivity, and exposure to temperature change and sea level rise. High social sensitivity to climate change is indicated where there is higher employment within natural resource-dependent industries, lower per capita income and median home values, higher percentages of minority populations, and a higher percentage of individuals lacking a high school education. Biophysical sensitivity for each reserve is based on the relationship between annual spring atmospheric temperature with rainfall data and water quality factors such as water temperature, dissolved oxygen and pH.

Social Data Sources

There are several existing sources of information that provide socio-demographic information for Reserve targeted watersheds. While the targeted watersheds may not include all of the human communities that

relate to and/or impact the reserve, they provide a standard database of information for reserves. Additional site specific data is encouraged to complete a picture of the socio-demographic landscape appropriate for each reserve.

NOAA's Spatial Trends in Coastal Socioeconomics (STICS) Web site holds a plethora of information to assist you in describing the social and economic landscape within reserve targeted watersheds. The Web site contains demographic information from the U.S. Census Bureau, personal income and employment from the Bureau of Economic Analysis, demographic projections developed by Woods and Poole Economics, Inc., and marine recreation from the National Survey on Recreation in the Environment. The Quick Report Tool on the STICS Website offers a map-based interface to quickly determine estimates of demographic and economic characteristics, many of which are clipped to the reserve targeted watersheds. STICS offers:

Census data is available by state coastal zone boundary and includes population, population density, race, sex, age and household information. You can also clip this data by zip code.

National Center for Education Statistics allows users to view maps of states and school districts, while overlaying statistics on population and housing, race and ethnicity, economics and social characteristics.

Bureau of Economic Analysis data is available for NERRS targeted watersheds and includes population, personal income, per capital personal income and earnings by industry.

Woods and Poole Economics, Inc. data is available for NERRS targeted watersheds and includes projections to 2040 for population, population density, race, sex, total employment and earnings, personal income, household income and total food service and retail sales.

National Ocean Economics Program coastal economy data is available for NERRS targeted watersheds and includes number and types of industries, numbers employed per industry, wages per industry, Gross Domestic product per industry.

NOAA's Economics: National Ocean Watch (ENOW) describes six economic sectors that depend on the oceans and Great Lakes including living resources, marine construction, marine transportation, offshore mineral resources, ship and boat building, tourism and recreation. Annual time series data are available for 448 coastal counties, 30 coastal states, and the nation, derived from the Bureau of Labor Statistics and the Bureau of Economic Analysis. The economic indicators include establishments, employment, wages, and gross domestic product. Also see the ENOW Explorer for easy on-line exploration of the data.

NOAA's Coastal County Snapshots turns complex data into easy-to-understand stories and includes charts and graphs to illustrate relationships. The data is organized by coastal state and county and provides information on flood exposure including county demographics, infrastructure, and environment within the flood zone; ocean jobs including economic value
of jobs depending on ocean and Great Lakes resources; and wetland benefits such as how they contribute to safer, cleaner, and more productive coastal communities.

NOAA's State of the Coast Web site provides quick facts and detailed statistics through interactive visualizations that highlight what we know about coastal communities, ecosystems, and economies, as well as how climate change might impact the coast. Information about communities includes populations living in

coastal watershed counties from 1970 projected to 2030 and water uses and sources in coastal counties for each state from 1985-2005. Coastal economy data includes coastal gross domestic product from 1999-2010 state recreation fishing data from 1981-2009 and commercial fishing data from 1950-2010, information on the top 150 ports, and energy production estimates from 1960-2009. This site also includes ecosystem statistics on coastal ecosystem health, invasive species, nutrient pollution, contaminants and wetlands, as well as information on climate vulnerability. There is an index for coastal vulnerability to sea level rise; populations in the 100 year flood zone for 2000-2020, including those at elevated risk such as the aged and impoverished; and 2010 federally insured assets.

Social Vulnerability Index for the United States was developed by the Hazards and Vulnerability Research Institute at the University of South Carolina and synthesizes 32 socioeconomic variables, which the research literature suggests contribute to reduction in a community's ability to prepare for, respond to, and recover from hazards. The data were culled from national data sources, primarily those from the United States Census Bureau. Scores for variables identify visually those counties most and least vulnerable. The numerical social vulnerability score contends that nine significant components explain 76% of the variance in the data. Among them are socioeconomic status, elderly and children, rural agriculture, housing density, black female-headed households, gender, service industry employment, unemployed Native Americans, and infrastructure employment.

Climate Sensitivity of the National Estuarine Research Reserve System (also Appendix 8) is a report that explains the extent of relative climate sensitivity in the reserves by looking at five factors: social, biophysical, and ecological sensitivity, and exposure to temperature change and sea level rise. High social sensitivity to climate change is indicated where there is higher employment within natural resource-dependent industries, lower per capita income and median home values, higher percentages of minority populations, and a higher percentage of individuals lacking a high school education. Biophysical sensitivity for each reserve is based on the relationship between annual spring atmospheric temperature with rainfall data and water quality factors such as water temperature, dissolved oxygen and pH.

Climate Data Sources

Climate Wizard provides a user friendly way to access leading climate change information and visualize the impacts anywhere on Earth. The user can choose a state or country and can assess how climate has changed over time and project what future changes are predicted to occur in a given area. You can view historic temperature and rainfall maps, view future predictions of temperature and rainfall, and download climate maps.

Ecoclim is a series of almost 10,000 future climate surfaces downscaled to 10 square kilometer resolution for the terrestrial surface of Earth. Ecoclim data are available either globally or clipped to seven major zoogeographic regions –so very broad scale, but perhaps useful for big picture overview. Another tool that does not operate on a GIS platform, but Web interface, is Climate Wizard.

NOAA's Sea Level Rise and Coastal Flooding Impacts Viewer tool shows how various levels of sea level rise will impact coastal communities. The current project areas include Mississippi, Alabama, and parts of Texas and Florida, with additional coastal counties to be added in the near future. Visuals and the accompanying data

and information cover sea level rise inundation, uncertainty, flood frequency, marsh impacts, and socioeconomics.

PRISM climate mapping system PRISM (Parameter-elevation Regressions on Independent Slopes Model) is a unique knowledge-based system that uses point measurements of precipitation, temperature, and other climatic factors to produce continuous, digital grid estimates of monthly, yearly, and event-based climatic parameters. PRISM data sets are recognized world-wide as the highest-quality spatial climate data sets currently available.

Sea Level Rise Affecting Marshes Model simulates the dominant processes involved in wetland conversions and shoreline modifications during long-term sea level rise. It is a complex decision tree incorporating geometric and qualitative relationships is used to represent transfers among coastal classes. The process accounts for inundations, erosion, overwash, saturation, and accretion. It is applied to 26 land categories derived from the National Wetlands inventory and covers a span from dry land to open water. Model incorporates Intergovernmental Panel on Climate Change projections as well as fixed rates of sea level rise to create sea level rise scenarios.

U.S. Global Change Research Program provides regional and sectoral climate change information and data, as well as a resource library for better understanding of climate science and climate impacts.

WorldClim is a set of global climate layers (climate grids), including past observed data, past modeled data, and future modeled data with a spatial resolution of a square kilometer. They can be used for mapping and spatial modeling in a GIS or other computer programs.

The Strategic Plan: Adaptive Management through Issue-Based Planning

About This Section

Per the Federal Code of Regulations 15 CFR 921.13 (a)(1), management plans are required to identify management issues, reserve goals and objectives, and actions for meeting the goals and objectives. These items should be embodied in the strategic plan element of the management plan. The strategic plan will provide direction and structure for the reserve to take cohesive action towards meeting objectives over the next five years. This section outlines the elements of the strategic plan; these include vision, mission, coastal management issues, goals, objectives, and actions. There should be a clear link between the issues outlined and the goals and objectives created to address them. The objectives will form the basis for evaluation of progress and success, and the actions will inform how the plan is implemented. Examples, resources, and case studies are provided to support the reserve strategic planning process. Part I of the Management Plan Guidelines provides direction and advice on a process for developing many of the elements within the strategic plan, please refer to Part I prior to crafting the strategic plan.

Plan Contents

A. Reserve Vision

The reserve vision statement is the overarching description of what the reserve would like to achieve or accomplish. Vision statements should be forward looking and reflect how the reserve wants to be distinguished.

Example: Vibrant estuaries cherished by their communities –San Francisco Bay Reserve

B. Reserve Mission

The reserve mission statement should describe the reserve's core purpose and focus, the reserve's reason for existence. This is a short static statement written in the present tense that describes the organizations unique contributions.

Example: To provide a basis for informed stewardship of estuaries in Southwest Florida through research and education – Rookery Bay Reserve

Strategic Plan

__ Vision
__ Mission
__ Priority coastal management issues
__ Reserve goals, objectives, actions
__ Performance measures for each objective ♦

C. Reserve Coastal Management Issues

Part I of this document provides guidance on identifying and selecting reserve priority issues, and Part II provides important information about stressors on the reserve to consider as described in the 'Introduction to the Reserve.' This section should be a succinct summary and prioritization of issues for the reserve. The

most pressing and pertinent coastal management issues facing the reserve need to be identified in order to develop relevant goals and meaningful objectives. Reserve issues should be included that relate to one of the issue areas identified in the Reserve System Strategic Plan. There are many ways to determine the primary issues including research findings, needs assessments, focus groups, surveys, etc. It is advantageous for all reserve staff to be involved in the process of engaging stakeholders and identifying the most pressing issues the reserve will address.

D. Creating Relevant Goals

A goal is a broad statement of what the organization plans to do and/or enable in the future. Goals should advance the mission of the program. They may be written for a five year time frame or longer, but ultimately, they should be written so that significant progress toward meeting them can be achieved. During a plan revision, it may be common for goals to remain the same, but objectives and actions to change given the amount and type of progress made towards that goal.

Goals should be written to address the most pressing coastal management issues, be based on the reserve niche, and be supported by the program. A manageable number of goals, approximately 3-6, should be written to capture the breadth and depth of the reserve's niche. Part I of this document encourages and integrated strategic planning process for multiple programs to contribute to the development and achievement of goals. Hence, all reserve programs should contribute their skills and expertise to developing and accomplishing reserve goals.

Tips for Writing Goals

- Goals describe a desired future state that the organization attempts to achieve.
- Goals should reflect conditions that can be changed and addressed via programs.
- Goals should be directional and leave room for continual improvement. Use words that identify improvement –increase, improve, reduce, etc.

Example Goal Statements

- Reduce the impact of watershed land use on reserve resources
- Improve natural biodiversity within the reserve
- Reduce the impact of invasive species and habitat loss on reserve biodiversity

E. Creating Meaningful Objectives

An objective is a specific statement of expected results that contribute to the goal(s). Objectives establish the standards of achievement in terms of some measure of improvement in existing condition. Reserves should strive to create SMART objectives: specific, measurable, attainable, relevant, and time-bound. They should be results oriented and describe the desired changes in the target audience, resource, or organization. These statements are the most important statements in strategic planning and should first focus on ensuring they are attainable and measurable within the time period of the plan. Objectives provide a measuring tool for progress towards the goals; the reserve should be able to quantitatively measure progress based on these statements that can then be communicated to stakeholders and leadership. Writing strong objectives takes judgment and skill; and devoting the necessary time and effort pays off in better

planning, better results, and effective evaluation of progress. Each goal may have several objective statements. While objectives will likely require several skill sets, or sector skills, to accomplish, it is advisable that one sector take leadership for each objective, ensuring the coordination of integrated, multi-sector actions and evaluation of progress. This is the level where adaptive management becomes important. Certain actions may not yield the desired result and may need to be tweaked. As understanding of an issue increases, more appropriate strategies may need to be employed. It will be important for the objective lead to understand whether the actions are effective or alternatives are required. Hence, it is suggested that objectives have a designated sector lead to track progress.

Tips for Writing SMART Objectives

- "Specific" means using strong action verbs to focus on what you want to do. Statements reflect clearly "what" needs to done, "why" it's important, "who" is doing it, and "when" it will be done.
- "Measurable" means ensuring that there is a quantitative way to measure the change the reserve wants to realize.
- "Attainable" means that they need to stretch the organization, but not so far that people lose motivation. They should be realized within the five year period of plan.
- "Realistic" means having the appropriate resources including the right people with the right skills, money, equipment, and capacity.
- "Time-bound" means they should create motivation and urgency to accomplish them within the five year period of the plan.

Example Objective Statements

Who/What *Target*	Change *Action Verb*	In What *Expected Results*	By When *Time Frame*
Local community planners	improve	their capacity to write climate change adaptation plans	within 1 year
Watershed management	are developed to	coordinated conservation strategies focused on sustainable ecosystems	by 2013
Unauthorized activities	are reduced	on the trail system to promote safe user experiences	by 2014

F. Creating Clear Actions

Actions should support achievement of the objectives. An action statement explains "how" an objective will be met. Actions may be undertaken by one or multiple sectors, but should be coordinated by the objective lead, so that as new information arises about the impacts of the actions, management decisions can be adjusted or maintained. Sector leads for each action should be indicated. Adaptive management focuses on learning and adapting, through partnerships between reserve staff, resource managers, coastal decision makers and stakeholders, who learn together how to create and maintain sustainable resource systems. It is more than monitoring activities and changing direction when failure arises. When developing actions, several alternatives should be explored, the outcomes of these alternatives should be predicted based on the current state of knowledge and then using professional judgment, those actions that are predicted to be the most effective should be written into the plan. During the course of the plan, evaluation of results should be ongoing to adapt when necessary.

Tips for Writing Actions

- Actions describe how you work and what you are working on.
- Actions describe collaborations and mechanisms for achieving work products.

Example Action Statements

- Provide training to community planners on understanding vulnerability and developing adaptation plans focused on protecting resources within the reserve targeted watershed.
- Partner with land owners within the reserve to identify existing conservation strategies, their compatibility with one another, and options for improvement.
- Coordinate with county land partners to place signs in high traffic areas of the trail system to increase public awareness of authorized activities.

G. Developing Practical Performance Measures

Performance measures track if and how well a program is meeting its objectives and ultimately its mission. They provide data on trends and can inform future plans, policy and program budgeting. They provide a quantitative means to communicate those trends and progress toward objectives to key audiences. In addition to the Reserve System national performance measures developed to track Reserve System progress, reserves are encouraged to develop site specific performance measures and targets for reserve objectives will help quantify progress and facilitate communicating success to key stakeholders.

"If you can't measure it, you can't manage it."

– Kaplan

The three measures that relate to high priority management plan objectives identified per guidance from NOAA's former National Policy and Evaluation Division (NPED) should be included. (Note: If during the period that the management plan is active the objectives change and the measures are not applicable or it became challenging to collect that data due to extenuating circumstances, then NOAA and the reserve will work to identify a new measure and target.) During an evaluation, NOAA will review the original measure and target as well as the status of the new measure and target.

While the above measures are the only ones required, it is advisable that performance measures and associated targets are established for as many objectives as possible. Performance measures should help the reserve understand the key benefits of their activities to specific audiences and should illustrate why the programs matter and to whom. It is important to have a baseline, set targets, and identify the unit of measurement and how it will be counted. If baseline data isn't available, it may be more appropriate to collect data for a baseline than establish measures, so that measures can be created in the future.

Example Performance Measures

Objective:	**Strategy:**	**Performance Measure:**	**Target:**
Local community planners will improve their capacity to write climate change adaptation plans by 2017.	The Reserve's Coastal Training Program will develop targeted workshops promoting the understanding and use of climate change science and monitoring, including information gained from the Reserve sentinel site monitoring, to inform adaptation activities.	Number of new targeted workshops that build coastal decision- maker capacity and promote the use of recent research results that address climate change impacts and adaptation alternatives. Performance Measure: Number of new targeted workshops that build coastal decision-maker capacity and promote the use of recent research results that address climate change impacts and adaptation alternatives.	Ten workshops focused on building coastal decision-maker capacity to use and apply climate data and information to develop adaptation alternatives.

Resources

Program Development and Evaluation: Provides knowledge, skills and tools to design and implement projects that have measurable impacts on a target audience. Tools include models that provide situational analysis, priority setting, program action – the logic model – and evaluation.

www.csc.noaa.gov/training/ and *www.uwex.edu/ces/pdande/evaluation/evallogicmodel.html* and *www.uwex.edu/ces/pdande/progdev/index.html*

NOAA's Conducting Needs Assessments Course: Provides an online self-guided course offering an introduction to needs assessments and how to conduct one.

NOAA's Meaningful Evaluation Course: Provides an understanding of all elements of program and project evaluation so programs can develop evaluation plans.

NOAA's Focus Groups, Facilitation, and Engagement Publications: Provides information on conducting focus groups, facilitating effective meetings, survey design and delivery, preparing to write your strategic plan, stakeholder engagement, understanding risk behavior, and resiliency planning.

NOAA's Preparing to Write Your Strategic Plan Publication: Provides a multi-step process to systematically assess the direction and priorities of an organization, as well as tools and job aids for assessing target populations, performing SWOT assessments, developing niche, and identifying program outcomes.

All About Strategic Planning: Provides information, guidance, and tools about the benefits and process of strategic planning.

Strategic Planning in the Public Sector: Provides information and examples of process and approaches to strategic planning.

Stakeholder Involvement: Environmental Protection Agency provides information on stakeholder involvement evaluation and research, including lessons learned, barriers, and innovative approaches to stakeholder involvement.

Perspectives on Strategic Planning in Public Sector: Report on strategic planning approaches, philosophies, and processes to achieve desired results.

Mind Tools, Ltd.: Provides information about how to undertake a SWOT analysis, discover new opportunities, as well as manage and/or eliminate threats. Mind Tools also provides information about strategy tools, project management, problem solving, team management, and communication skills.

Structured Decision-Making: Provides an organized approach to identifying and evaluating creative options and making choices in complex decision situations.

Reserve System Program Foundations

About This Section

Each reserve contributes to Reserve System-wide programs and priorities, as well as defines local programs and priorities to address site specific needs and issues. It is important to understand the key elements of system-wide programs that contribute to national and local efforts. Information about these programs has historically been included in management plans in a variety of ways; this section offers a consistent approach for describing system-wide programs.

This section provides a standard format for describing the system-wide programs, including mandatory text and key questions to organize information on program context, capacity, delivery, needs, and opportunities. .Part I 'Preparing to Write a Strategic Plan' section two 'Assessing Skills and Capacities of Reserve Programs' discusses how reserves may conduct program SWOT analysis. Information within each program category- context, capacity, delivery, needs and opportunities- should be readily available if the programs undertake a SWOT analysis. Reserves should try to respond to all of the questions below to the best of their ability. This information should provide readers a clear picture of program capacities and focus, as well as how the program is supporting achievement of reserve goals and objectives. Together they create a complete picture for how the system works nationally and locally.

While stewardship is a sector program at many reserves and there are national efforts to support stewardship functions, this section concentrates on those sectors with system-wide programs. Foundational capacities for stewardship vary across sites and will be captured within research and monitoring, as well as the resource protection, land acquisition, public access and visitor use components, and if applicable, the restoration and/or resource manipulation components.

Each program description can be organized in separate chapters or be culminated into a single "Program Foundations" chapter. If reserves choose to create a sector based strategic plan (i.e. sector based goals), each of these descriptions should be included with that sector based goal chapter.

Program Foundations		
Research and Monitoring Program __ Mandatory system-wide text __ Program Context, capacities, and delivery __ Needs and Opportunities __ Research related objectives and actions♦ __ Monitoring and evaluation strategies♦	Education Program __ Mandatory system-wide text __ Program context, capacities, and delivery __ Needs and Opportunities __ Education related objectives and actions♦ __ Monitoring and evaluation strategies♦	Coastal Training Program __ Mandatory system-wide text __ Program context, capacities, and delivery __ Needs and Opportunities __ Training related objectives and actions♦ __ Monitoring and evaluation strategies♦

Plan Contents

A. Research and Monitoring Program

(Mandatory text begin)

The National Estuarine Research Reserve System's mission provides that reserves are protected and managed to afford opportunities for long-term research. Research at each reserve is designed to fulfill the Reserve System goals as defined in the regulations (15 C.F.R Part 921(b)):

- Address coastal management issues identified as significant through coordinated estuarine research within the system;
- Promote federal, state, public and private use of one or more reserves within the system when such entities conduct estuarine research;
- Conduct and coordinate estuarine research within the system, gather and making available information necessary for improved understanding and management of estuarine areas.

To sustain these system goals, the 2011-2016 Reserve System Strategic Plan outlines research objectives that support the focus areas of climate change, habitat protection, and water quality:

- Expand capacity to monitor changes in water quality and quantity, habitat, and biological indicators in response to land use and climate change drivers.
- Improve understanding of the effects of climate change and coastal pollution on estuarine and coastal ecology, ecosystem processes, and habitat function.
- Characterize coastal watersheds and estuary ecosystems and quantify ecosystem services to support ecosystem-based management of natural and built communities.
- Increase social science research and use of social information to foster coastal stewards that value and protect estuaries.

The Reserve System's research and monitoring programs provide the scientific basis for addressing coastal management challenges. Reserve research and monitoring activities provide valuable information about estuarine resources to increase understanding and awareness of their importance to a variety of audiences including scientists, resource managers, educators, and the general public.

Reserve System Research Programs

Currently, there is one focused effort to fund estuarine research in the Reserve System.

The National Estuarine Research Reserve System Science Collaborative is a program that focuses on integrating science into the management of coastal natural resources. Through an adaptively managed program, the Science Collaborative funds collaborative research and science transfer programs and projects that develop and apply science-based tools to better understand how to detect, prevent, and reverse the impacts of coastal pollution, habitat degradation and ecosystem processes in a time of climate change. The program is designed to

enhance the Reserve System's ability to support decisions related to coastal resources through collaborative approaches that engages the people who produce science and technology with those who need it. In so doing, the Science Collaborative seeks to make the process of linking science to coastal management decisions, practices, and policies more efficient, timely, and effective and share best practices and examples for how this can be done.

Reserve System Monitoring Program

The System-Wide Monitoring Program provides standardized data on national estuarine environmental trends while allowing the flexibility to assess coastal management issues of regional or local concern and is guided by the Reserve System-Wide Monitoring Program Plan. The principal mission of the monitoring program is to develop quantitative measurements of short-term variability and long-term changes in water quality, biological systems, and land use/ land cover characteristics of estuaries and estuarine ecosystems for the purposes of informing effective coastal zone management. The program is designed to enhance the value and vision of the reserves as a system of national references sites and focuses on three ecosystem characteristics:

1. Abiotic Characteristics: Abiotic measurements are supported by standard protocols, parameters, and approaches that describe the physical environment including weather, water quality, hydrological, and sediment related parameters. The monitoring program currently provides data on water temperature, specific conductivity, percent saturation of dissolved oxygen, pressure, pH, turbidity, salinity, concentration of dissolved oxygen, and pressure corrected water depth. Meteorological data include air temperature, relative humidity, barometric pressure, wind speed, wind direction, rainfall, and photosynthetically active radiation (PAR). In addition, the program collects monthly nutrient and chlorophyll a samples and monthly diel samples at one SWMP data logger station. Data is Federal Geographical Data Committee compliant and available via the *Reserve System Centralized Data Management Office*.

2. Biotic Characteristics: As funds are available, reserves are focusing on monitoring habitats and biodiversity.

3. Watershed and Land Use Classifications: The Reserve System is examining the link between watershed land use and coastal habitat quality by tracking and evaluating changes in coastal habitats and watershed land use/cover. This element is guided by the Reserve System Habitat Mapping and Change Plan.

Building on these foundational elements, the Reserve System is developing a network of sentinel sites and the capacity to assess the impact of sea level/lake level changes and inundation on the diverse set of coastal vegetative habitats represented in the system. Reserves are implementing a suite of activities, as described in the 2012 Reserve System Sentinel Site Guidance Document, to assess the relationship between vegetative communities (marsh, mangrove and submerged aquatic vegetation) and sea level. Reserves are adding surface elevation tables and monitoring pore water chemistry along vegetation monitoring transects and linking their System-Wide Monitoring Program to a network of specialized spatial infrastructure to allow precise measurement of local sea level and lake level changes and subsequent impacts to key habitats. The Reserve System is working in partnership with NOAA's National Geodetic Survey and the Center for Operational Oceanographic Products and Services to support the development of sentinel sites.

(Mandatory text end)

Research Program Context

A. What is the geographic scope of your program?
B. What information has been gained by the program since the last management plan?
C. Who are the target audiences for the research developed at the reserve?
D. How would the research community surrounding the reserve be characterized?
E. What are the most pressing research issues and questions that the reserve will address and how do they align with the Reserve System Strategic Plan?

Research Program Capacity

A. What staff, facilities, infrastructure, etc. support your research program currently?
B. What partners will you work with to accomplish your research?

Research Program Delivery

A. How will the reserve locally implement the system-wide programs (e.g. SWMP) and national programs (e.g. NSC) and priorities (e.g. NERRS Climate Change Initiative)?
B. How will the reserve implement local and regional monitoring and research?
C. How will the research program support other functions at the reserve?
D. How will the research program support or be influenced by other programs at the reserve?
E. How does the reserve evaluate the research program currently? Will this change in the next five years?
F. What are the major outcomes the research program wants to achieve? What research and/or monitoring contributions will be made to the scientific or management community?

Research Future Needs and Opportunities

A. What are the research needs and priorities identified by local stakeholders?
B. What is the nexus between those needs and projected capacity in the next five years?
C. What are the limitations of the research program? What are the opportunities?

Research Related Objectives and Actions

A. List research objectives from strategic plan
B. List research actions that will advance those objectives from the strategic plan

B. Education Program

(Mandatory text begin)

The National Estuarine Research Reserve System's mission includes an emphasis on education, interpretation, and outreach. Education at each reserve is designed to fulfill the Reserve System goals as defined in the regulations (15 C.F.R Part 921(b)):

- Enhance public awareness and understanding of estuarine areas and provide suitable opportunities for public education and interpretation;
- Conduct and coordinate estuarine research within the system, gathering and making available information necessary for improved understanding and management of estuarine areas.

To sustain these system goals, the 2011-2016 Reserve System Strategic Plan outlines education objectives that support the focus areas of climate change, habitat protection and water quality:

- Enhance the capacity and skills of teachers and students to understand and use Reserve System data and information for inquiry-based learning; and
- Increase estuary literacy and promote active stewardship among public audiences through the development and delivery of tools and programs addressing climate change, habitat protection, and water quality.

The Reserve System provides a vehicle to increase understanding and awareness of estuarine systems and improve decision-making among key audiences to promote stewardship of the nation's coastal resources. Education and interpretation incorporate science-based content into a range of programs and methodologies that are systematically tailored to key audiences around priority coastal resource issues.

Reserves conduct formal and informal education activities, as well as outreach activities that target culturally diverse audiences of educators and students, environmental professionals, resource users and the general public. Education and public programs, interpretive exhibits and community outreach programs integrate elements of Reserve System science, research and monitoring activities and ensure a systematic, multi-faceted, and locally focused approach to fostering stewardship.

The reserves system is committed to preparing tomorrow's future leaders with the knowledge and understanding of our nation's oceans and coasts to be responsible stewards. To fulfill this commitment, the Reserve System has created the K-12 Estuarine Education Program (KEEP) to increase the estuary literacy of students, teachers and the general public. The KEEP Program helps students and teachers learn about essential coastal and estuarine concepts, develop data literacy skills and strengthen their critical thinking, team building, and problem-solving skills. K-12 and professional development programs for teachers include the use of established coastal and estuarine science curricula aligned with state and national science education standards and frequently involves both on-site and in-school follow-up activity.

Community education is another priority for the Reserve System. Community education programs foster behavioral change to promote resource conservation. These programs work with audiences whose choices directly impact the integrity of our estuaries and their associated watersheds.

(Mandatory text end)

Education Program Context

A. What is the geographic scope of your program?
B. What information has been gained by the program since the last management plan? (e.g., from market analysis and needs assessments or other assessments)
C. Who are the target audiences for reserve education programming, identifying population and reach, and why were they selected? Distinguish audiences among professional development programs, students programs, public outreach programs, and/or community education programs.
D. What are the priority issues for your reserve that your education program can address and how do they align with the Reserve System Strategic Plan?

Education Program Capacity

A. What staff, facilities, infrastructure, etc. support your education program currently?
B. What partners will you work with to accomplish your education program?

Education Program Delivery

A. How will the reserve locally implement and/or align with the system-wide programs (e.g. KEEP, SWMP), national programs (e.g. NSC) and priorities (e.g. NERRS Climate Change Initiative)?
B. What major activities will the education program implement and what methodologies will it employ?
C. How will the education program support or be supported by other programs at the reserve?
D. How will the education program deliver and disseminate results?
E. How does the reserve evaluate the education program currently? Will this change in the next five years?
F. What major impacts or outcomes does the education program want to achieve and what behavior change does the reserve wish to influence?

Education Future Needs and Opportunities

A. What are the education needs identified via assessment or by local stakeholders?
B. What is the nexus between those needs and projected capacity in the next five years?
C. What are the limitations of the education program? What are the opportunities?

Education Related Objectives and Actions

A. List education objectives from strategic plan
B. List education actions that will advance those objectives from the strategic plan

C. Coastal Training Program

(Mandatory text begin)

The National Estuarine Research Reserve System's mission includes an emphasis on education and interpretation. The Reserve System recognizes it has a responsibility to educate coastal decision makers and supports the Reserve System goals, as defined in the regulations (15 C.F.R Part 921(b)), through the Coastal Training Program:

- Enhance public awareness and understanding of estuarine areas and provide suitable opportunities for public education and interpretation;
- Conduct and coordinate estuarine research within the system, gathering and making available information necessary for improved understanding and management of estuarine areas.

To sustain these system goals, the 2011-2016 Reserve System Strategic Plan outlines coastal training objectives that support the focus areas of climate change, habitat protection and water quality:

- Increase estuary literacy and promote active stewardship among public audiences through the development and delivery of tools and programs addressing climate change, habitat protection, and water quality.
- Improve the capacity and skills of coastal decision makers to use and apply science- based information in decisions that affect estuaries and coastal watersheds.

The Coastal Training Program provides up-to-date scientific information and skill-building opportunities to coastal decision makers responsible for making decisions affecting coastal resources. Through this program, reserves ensure that coastal decision makers have the knowledge and tools they need to address local critical resource management issues.

Coastal decision makers are defined as individuals whose duties include making decisions that affect the coast and its resources. The target decision-maker groups vary according to reserve priorities, but generally include groups such as local elected or appointed officials, managers of both public and private lands, natural resource managers, coastal and community planners, and coastal business owners and operators. They may also include groups such as farmers, watershed councils, professional associations, recreation enthusiasts, researchers, and more.

Reserves are uniquely positioned to deliver of pertinent information to local and regional decision makers given their place-based nature. Coastal Training Program coordinators know the local people, places, and science are able to skillfully convene training participants and experts to address coastal management issues. Coastal training programs are built upon solid and strategic program documents, including an analysis of the training market and assessment of audience needs. Coordinators then work with the results to identify how their program can best address local and Reserve System priority issues.

Partnerships are integral to the success of the program. Reserves work closely with several other NOAA programs, as well as a host of local partners in determining key coastal resource issues, target audiences, and expertise to deliver relevant and accessible programs.

(Mandatory text end)

Coastal Training Program Context

A. What is the geographic scope of your program?
B. What information has been gained by the program since the last management plan? (e.g. from market analysis and needs assessments or other assessments)
C. Who are the target audiences for reserve coastal training opportunities and why? What do you know about the skills, abilities, and current level of knowledge of the target audiences?
D. What are the priority issues for your reserve that your education program can address and how do they align with the Reserve System Strategic Plan?

Coastal Training Program Capacity

A. What staff, facilities, infrastructure, etc. support your training program currently?
B. What partners will you work with to accomplish your training program?

Coastal Training Program Delivery

A. How will the reserve locally implement and/or align with the system-wide programs (e.g. KEEP, SWMP), national programs (e.g. NSC), and priorities (e.g. NERRS Climate Change Initiative)?
B. What major activities will the training program implement and what methodologies will it employ?
C. How will the training program support or be supported by other programs at the reserve?
D. How will the training program deliver and disseminate results?
E. How does the reserve evaluate the training program currently? Will this change in the next five years?
F. What major impacts or outcomes does the training program want to achieve and what behavior change does it wish to influence?

Coastal Training Future Needs and Opportunities

A. What are the training needs identified via assessment or by local stakeholders?
B. What is the nexus between those needs and projected capacity in the next five years?
C. What are the limitations of the training program? What are the opportunities?

Training Related Objectives and Actions

A. List training objectives from strategic plan
B. List training actions that will advance those objectives from the strategic plan

Administrative Plan

About This Section

The administrative plan is a required element of a management plan and should outline staff roles in administration, research, education, and surveillance and enforcement, per the Federal Code of Regulations 15 CFR 921.13 (a)(2). The administrative plan should outline the means and support necessary to implement the goals and objectives of the reserve. It should provide an overview of the organizational and administrative framework that governs management of the reserve, address the roles and responsibilities of staff, as well as identify strategic partnerships and advisory committees. In effect, the administrative plan supports all other components in the reserve management plan; objectives and actions do not need to be integrated into the strategic plan element given this section will support achieving all reserve goals and objectives.

Specifically, the administrative plan should include: an organizational framework; a staffing plan; a description of strategic partnerships and advisory committees; an administrative plan with objectives and actions. Optional elements could include: volunteer plan; vessel and vehicle plan; communications plan, and additional information about administrative initiatives of the state and reserve that impact the future of reserve operations.

Plan Contents

A. Organization Framework and Management Authorities

This section builds on the 'Introduction to the Reserve' component to provide more information about the state agency administrative structure and management authorities. This section should highlight the mission of the agency and why it is an appropriate match to host the reserve. An organizational chart outlining the current location of the reserve within the state agency aligned with NOAA's management structure should be included; see Figure 9. Additionally, an organizational chart of the reserve should be included.

If applicable, this section should capture any changes in the host agency since designation and the reasons for those changes. It should also include all information about state law, codes, or management authorities that impact the administration of the reserve.

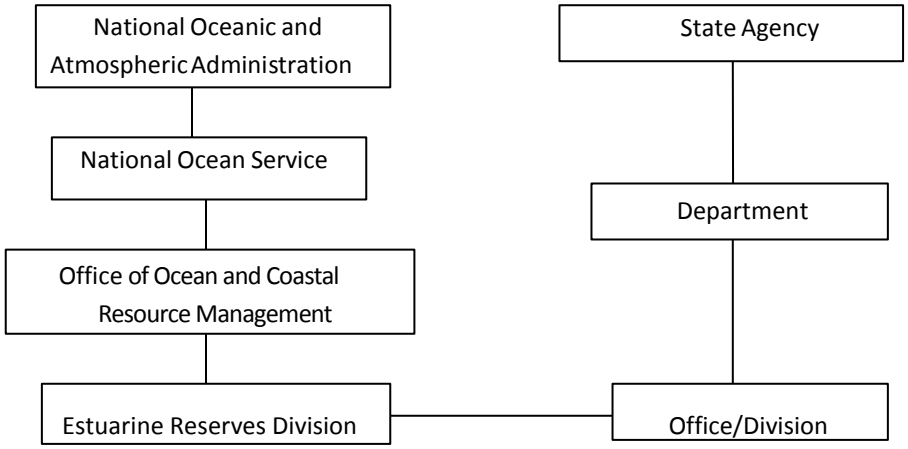
Administrative Plan

__ Organizational framework
__ Organizational charts
__ Current staffing and needs
__ Strategic partnerships
__ Advisory committees
__ Administrative objectives and actions
__ Volunteer plan ♦
__ Vessel and vehicle plan ♦
__ Communications plan ♦

B. Current Staff and Needs

This section should clearly outline the number of staff employed to support reserve programs, as well as their roles and responsibilities. Indicate if employees are full-time, part-time or seasonal and the location of their primary office. Include an administrative chart to visually represent the reserve's staff positions, administrative structure and oversight. If applicable, indicate strategies to secure state funding for core staff positions.

Figure 9. Organizational Relationship



Include detailed information about anticipated staffing needs to better support the mission of the reserve and projected program developments. Outline the roles and responsibilities of these anticipated positions, the goal-based justifications, and reference any supporting documents that recommend these staffing needs (i.e. internal reviews and evaluations findings). If available, include information on how these future positions would be funded.

C. Strategic Partnerships

The administration of a reserve occurs through a collaborative process involving a variety of agencies and organizations at various levels of engagement. Strategic partnerships are those that leverage specific resources to carry out core functions of the reserve and are often associated with facilities, enforcement, or staffing. This section should not be an exhaustive list of all reserve partnerships, but instead briefly describe key partnerships. If applicable, this section could include information about the reserve's Friends group, in particular the role and responsibility of the group in supporting the mission of the reserve.

All Memoranda of Understandings should be included in the appendix of the management plan. If there is a need to compile a complete list of all organizations the reserve current partners with, it should also be included as an appendix.

D. Advisory Committees

Reserve advisory committees are composed of local community stakeholders and assist in guiding the policies and management of the reserve. This section should detail the roles, membership and expectations of the reserve's advisory committee. For example, do committee members provide feedback and recommendations on-site management and implementation strategies; assist in seeking support for Reserve programs; represent the interests of users of the Reserve and its' products, expected to discuss relevant issues with the community and so on. If applicable, provide information about sub-committees or task forces.

Optional additional information about the advisory committees could include:

- How members are appointed and how long they serve
- General meeting structure (i.e. open to the public) and frequency of meetings
- How are decisions made (i.e. consensus)
- Information about the general composition of the committee by
    - A list of the specific organizations/users represented on the advisory committees or
    - A list of members and affiliations from a prior year

E. Objectives and Actions

The objectives and actions developed for the administrative plan should ensure the administrative, operational and financial capacities of the reserve are adequate to effectively implement the goals of the Reserve. Administrative objectives assist in the management of the reserve by addressing the operational needs and plans to maintain and train staff, maintain vessels and facilities, complete administrative processes, as well as work in the community through strategic partnerships and advisory committees. Actions should be designed to effectively and efficiently utilize the existing administrative, infrastructure, fiscal, and human resources.

The objectives and actions developed here likely support and are related to achieving all of the reserve goals and objectives. Hence, they do not need to be integrated into the strategic plan. Reserves should clearly describe why these were crafted and how they move the reserve forward in meeting their goals and objectives. However, reserves may choose to integrate these objectives and actions if administrative issues are a central focus for the next five years. In NOAA's experience, we have found that reserves find it difficult to merge these types of objectives with programmatic objectives because they are central to supporting the entire plan.

North Carolina Reserve: Administrative Goal and Objectives

The North Carolina management plan developed a goal and several objectives that support the administration and operations of the reserve. In their administrative plan chapter they outline strong, relevant activities that will help them achieve their objectives. Reserves may choose to develop an administrative goal or they can simply list objectives within this component that directly support objectives within the strategic plan (*www.nerrs.noaa.gov/Doc/PDF/Reserve/NOC_MgmtPlan.pdf*).

F. Optional Plans That Support Programs and Their Management

1. Volunteer Plan

A volunteer plan can provide guidance for how a volunteer program builds connections with the community and supports reserve programs in meeting their goals and objectives. Volunteers are an invaluable resource to reserves. Considerations for creating a volunteer plan include:

Planning for Volunteers
Prior to starting a volunteer program, it important to assess needs that can be filled by volunteers and determine how the reserve will support the program as it does take a budget and expertise to run an effective program. It will be important to create and market clear position descriptions, including qualifications, purpose, timeframe, expected outcomes and evaluation criteria (if applicable). It will also be important to establish policies and procedures for administration and volunteers so that everyone is clear about what needs to happen before a volunteer can begin and while working.

Recruiting and Organizing Volunteers
Once the reserve establishes why the program should exist and clear functions that can be performed by volunteers, it is time to recruit, screen, interview and place volunteers in appropriate positions aligned with their ability, expertise and interest. It will be important to plan for the number of volunteers that can be adequately monitored and supported. Organizing teams of volunteers for certain areas can be useful to manage volunteers and provides them a network of people with similar interests to maintain engagement and give support to each other. It will be important to consider how the reserve will orient and train volunteers to perform duties and feel safe and productive when doing so. Once trained and performing duties, it will be important to ensure proper supervision, support and evaluation of efforts.

Supervising, Evaluating and Retaining Volunteers
Supervising volunteers takes time and attention to ensure they are effective, safe and happy. It will be important to outline steps for developing an evaluation system to determine whether the complement of volunteers continues to be suited to the reserve. It will also be important to identify ways to recognize the volunteer contributions as this helps to develop a bond with the reserve and ensure continued contribution.

2. Vessel and Vehicle Plan

A fleet of vehicles and vessels can be critical to supporting reserve objectives and activities. A fleet infrastructure plan could help determine when craft need to be repaired and/ or replaced, overseeing maintenance and repair work, procuring new craft and associated equipment, training staff in the proper use and safety protocols for each type of craft and associated equipment, and keeping required records for all fleet craft. If applicable, please identify policies for vehicles, including hybrids and additional energy saving plans.

3. Communication Plan

It is critical to communicate the importance and impacts of reserve efforts, as well as deliver key messages to key audiences regarding protecting and valuing the coastal resources reserves protect. See general areas appropriate for a communications plan below. Considerations for crafting a communications plan include:

Objectives and Target Audiences
Developing clear, measurable objectives is critical to the success of your communication plan. Think about what you want your communications activities to accomplish which directly relates to who you need to be communicating about what – for example, do you want to generate excitement, build awareness, educate on priority issues, maintain positive information flow, secure support for specific initiatives or projects? Identifying who you want to communicate to will help articulate the approach and how they want to receive information. It will be important to prioritize between primary audiences and others to achieve primary objectives.

Approach
It will be important to determine what methods the reserve will employ to reach target audiences. Questions that may help inform approach include: What types of communication media will the reserve use? Will a mix be useful for various objectives? Who will be involved in a successful approach to both internal and external communications? How much time will be focused on various elements?

Key Messages, Tactics, and Costs
Key messages are important to create. Remember to address who, what, when, where, why, and how to convey key information to influential audiences. Messages should be clear, benefit- oriented, and written so that target audiences will understand and relate. It will be important to develop a plan for how to communicate with target audiences and how often. Consider the types of tactics that will be most effective – print, electronic, in-person. It is important to choose substance over flash. Communication messages must be simple, clear, direct and audience-focused—no matter how slickly they are packaged—or they won't be read, heard or understood. It will be wise to set a budget for developing and employing communications strategies and products.

Timeline and Evaluating Success
It will be important to identify key times for targeting messages – are there key times when audiences are more receptive and/or seeking information to make decisions, how long will various efforts be pursued, how will you know when you've reached success? In order to understand the last question, it will be helpful if tangible success measures are identified – are you looking for a percentage change in audience behavior, are you hoping for increased financial support, etc.? Whether successful or not, it will be important to engage audiences and solicit feedback on how to better engage and communicate with them.

Resource Protection Plan

About This Section

The resource protection plan is a required element of a management plan, per the Federal Code of Regulations, 15 CFR 921.13. The general provisions provided by 15 CFR 921.1 state that reserves shall be open to the public to the extent allowed by state and federal law, multiple uses are allowed to the degree compatible with reserve purpose and use levels prescribed in the management plan. Additionally, regulations note that the management plan shall identify uses requiring a state permit, as well as areas where uses are encouraged or prohibited. Protecting the resources of the reserve serves as the foundation for all programmatic efforts and is central to the success of the reserve. It is important for reserves to protect the ecological unit representative of key land and waters within each biogeographic region and maintain it in the face of human and natural stressors that are continually increasing.

This plan should provide a description of the authorities which protect the reserve, allowable and unallowable uses per those authorities, uses requiring a permit, and surveillance and enforcement strategies to ensure appropriate use of the reserve.

Plan Contents

A. State Management and Statutory Authorities

The protection of the reserve relies on state management and regulatory authorities. This section should describe all authorities (federal, state, local and tribal (if applicable)) related to the protection and use of reserve resources. It should include a complete description of rules and regulations that govern access and activities on reserve property. It should also identify key partners in developing and upholding these authorities.

Questions to inform this section include: What are the state, federal, and local regulatory authorities in place to protect the reserve? What rules govern uses and when were these developed? What partners were and/or are involved in maintaining these regulations?

Resource Protection Plan

__ Management Authorities
__ Allowable and unallowable uses
__ Map of allowable uses
__ Surveillance and enforcement capacities
__ Resource protection challenges
__ Resource protection objectives and actions ♦
__ Monitoring and evaluation plan strategies ♦

B. Allowable and Unallowable Uses

This section should describe all allowable and unallowable uses within the reserve, based on the

above authorities, and where they may/may not occur respectively. A map and/or table that provide an overview of these uses are encouraged. Any uses requiring a permit should be identified. A rationale should be provided regarding why there are restrictions in certain areas. Pre-existing uses that occurred prior to designation should be discussed and evaluated if those uses are still occurring to determine compatibility with intent of reserve.

Questions to inform this section include: What are the allowable and unallowable uses in the reserve? Why are these uses allowable and/or unallowable? How were these designations determined? Where do these uses occur? Are there pre-existing uses that are still occurring and are they compatible with the intent of the reserve? If not, how will the reserve resolve these uses? Are there additional policies in development that may limit access in certain areas? When will these be likely to be implemented? Is there a mechanism to communicate allowable uses to users of the reserve?

C. Surveillance and Enforcement

This section should describe the personnel and strategies dedicated to enforcing the management authorities to ensure appropriate uses of the reserve. The plan should clearly outline how violations to specific uses will be addressed via the enforcement network with jurisdiction over these resources. Key partnerships and other land owner protection plans that support the management and protection of the reserve should be described and included within an appendix if directly protecting reserve lands.

Questions to inform this section include: What agencies are responsible for surveillance and enforcement of rules regarding use within the reserve boundary? What is the relationship between the state agency and enforcement officials? Is there a plan in place for surveillance and enforcement? Is there a clear line of communication between applicable reserve staff and enforcement officials? What are the key partnerships important to protecting the reserve? What role do these partners play?

D. Resource Protection Challenges

Maintaining adequate control of reserve resources can be challenging for a variety of reasons. This section should identify uses outside reserve boundaries that potentially impact reserve resources. It should describe how existing authorities and processes protect the reserve and how the reserve interfaces with these uses, e.g., is the reserve involved in reviewing permits for certain activities that may impact the reserve.

Questions to inform this section include: What activities occurring outside or within the reserve boundary impact or may potentially impact reserve resources? How does the reserve ensure these activities are not detrimental to the reserve? How do staff members interface with local entities to monitor and/or approve activities which may impact the reserve? Will reserve staff members be involved in permit review for activities occurring adjacent to the reserve?

E. Objectives and Actions

Like the administrative plan, this plan provides a foundational capacity to support the overarching goals and objectives within the strategic plan and be supported by other program efforts. If applicable, the reserve

can decide to incorporate specific objectives related to resource protection within the strategic plan or they can stand alone as foundational to all other elements within the strategic plan.

F. Monitoring and Evaluation Strategies

In order to effectively monitor whether resources are adequately protected, reserves must consider the following questions: What resource indicators does the reserve use to ensure ecosystem health? How will you monitor allowable and unallowable uses and adjust strategies to ensure protection? What are the frequency, timing and location of those monitoring activities? How does the reserve detect change in both resource and social indicators?

Public Access and Visitor Use Plan

About This Section

The public access plan is a required element of a management plan, per the Federal Code of Regulations 15 CFR 921.13. Public access can be defined as the ability of all members of the community to pass physically and visually to, from, and along the ocean shore, other waterfronts, and over public lands. The ability to enjoy the oceans, bays and rivers is directly related to the ability to reach them. A public access plan must try to allow for the long-term public use and enjoyment of the water and shoreline while minimizing damage to the resources. Depending on the geographic proximity and current access available to visitors, reserves may want to consider topics such as public transit, bike trails, ADA accessibility for all visitor facilities, and signage to ensure visitors can locate accessible areas and follow necessary rules for using resources wisely.

This plan should discuss public uses, opportunities, and challenges within the reserve. Objectives and actions should support public access and positive visitor experiences while maintaining adequate long-term protection of reserve natural and cultural resources.

Plan Contents

The following are key elements to be included within this section of the management plan. Discussion in response to the elements below should be addressed to the best of the reserve's ability given the unique stage and nature of the reserve.

A. Current Public Access

This section should include general information about where and how visitors, researchers, and other interested parties can access the reserve. This section should also include all relevant information and data that supports acceptable limits for public access or carrying capacity. Carrying capacity is the type and level of visitor use that can be accommodated while sustaining the desired resource and visitor experience conditions in the reserve. Visitor experience includes the perceptions, feelings, and reactions a person has while visiting the reserve.

Questions to inform this section include: What are reserve hours of operations and fees? Where are the land and water access points? What is the rationale for current public access structure? What purpose do these access points serve and to whom i.e. target audiences for access? Why are they relevant and important? Which public uses are permitted at these access points? What specific programs support access opportunities? What access is permitted to historical and or cultural areas of significance within the reserve?

Public Access and Visitor Use Plan

__ Current public access
__ Map of public access points
__ Public access challenges
__ Public access and visitor experience opportunities
__ Public access objectives and actions ♦
__ Monitoring and evaluation strategies ♦

If the reserve has conducted carrying capacity studies, the following questions should be addressed: What is the reserve's current carrying capacity? What are the reserve's limits of acceptable change in addressing carrying capacity? Does the reserve have any statistics regarding current attendance records, visitor use impacts and/or results of carrying capacity studies?

B. Public Access Challenges

This section should include an overview of challenges to provide public access and maintain adequate control and protection of natural and cultural resources. Studies on carrying capacity and surveys on visitor use can serve as foundations for future action.

Questions to inform this section include: What and where are the challenges in balancing public access and protection of natural resources? What specific impacts has the reserve seen from these challenges? Does the reserve anticipate exacerbation of these impacts? What changes in demographics do you predict for the future? How do those changes impact planning for the future? Will climate change impacts provide public access challenges? Will these impacts potentially change the nature of access in certain areas? Are there particular species of concern potentially impacted by large groups visiting the reserve at particular times of the year, e.g. breeding season, growing season?

C. Public Access Opportunities and the Visitor Experience

While balancing information from current uses and challenges, this section should describe the future opportunities to increase or decrease access to specific areas of the reserve.

Questions to inform this section include: Who are reserve future target audiences? What has been learned since the last management plan that provides input for this plan? What specific access policies will impact education, stewardship, research, and monitoring programs? Is the reserve trying to increase, reduce, limit public access and visitor use, and why? What are the primary themes that communicate the significance of the reserve to visitors? What strategies does the reserve implement to ensure that those interpretative themes are communicated? How does the reserve connect outdoor visitor use experiences to indoor exhibits?

D. Objectives and Actions

If applicable, this section should provide an overview of the strategic plan objectives and actions that relate to public access and visitor use. It will be important to consider the role of education, interpretation and outreach in managing public access and visitor use.

If applicable, discuss indicators and procedures for monitoring and evaluating these actions to determine if public access should be altered in the future.

E. Monitoring and Evaluation Strategies

In order to effectively monitor and evaluate the success of restoration habitats, consider the following questions: Has habitat function and structure been established to meet targets? Has biodiversity been established to meet targets? What are the long-term monitoring plans? Were methods used appropriate for meeting targets? Were new protocols used and if so, were they effective in meeting targets?

Resources

NOAA's Managing Visitor Use in Coastal and Marine Protected Areas Course: Provides participants with tools to identify and define unacceptable visitor use impacts to natural resources and visitor experiences. Participants of this course will be able to understand the human dimensions of coastal and marine management, apply recreation and visitor use management planning frameworks, identify visitor use issues, including visitor-resource and visitor-visitor impacts, craft a clear problem statement, develop measurable indicators for monitoring impacts and management and set standards for impact acceptability, and implement visitor use monitoring methods and management strategies and tactics.

Managing Visitor Impacts in Parks: a Multi-Method Study of the Effectiveness of Alternative Management Practices: Provides recommendations for outdoor recreation management within protected areas such as parks.

Monitoring and Management of Recreation in Protected Areas: the Contributions and Limitations of Science: Provides examples of significant contributions of science to visitor monitoring and management. It covers the related scientific purposes of explanation, causation, prediction and assessment.

Facility Development and Improvement Plan

About This Section

The facilities plan is a required element of a management plan, per the Federal Code of Regulations 15 CFR 921.13. Reserve facilities provide functional space for reserve work and programming, and serve as the face to the public providing venues for learning and serving as a learning tool themselves. Reserve facilities must face all of the pressures that come with working and building in the coastal zone including withstanding storms, surge, erosion, and elements of wind, salt, sand, humidity among others. Additionally, a changing climate will exacerbate these pressures resulting in increased erosion, frequency and intensity of storm events and associated surge, sea- level rise and associated salt water intrusion. These challenges require reserves to build facilities that will withstand these pressures and serve their intended purpose for the life cycle of the structure. NOAA is encouraging reserves to build new and improve existing facilities so that they are sustainable and resilient.

Facility Development and Improvement Plan

__ Purpose of facilities
__ Current facilities
__ Map of facility locations
__ Facility challenges and gaps
__ Planned facilities, facility upgrades, and exhibits
__ Climate and non-climate stressors
__ Facility descriptions
__ Operations and maintenance manual as appendix ♦
__ Long-term facility plan as appendix ♦

Supporting material is provided in *Appendix 10: Planning for Sustainable Facilities* that expounds on how to assess vulnerability of potential investments, principles for sustainability and resiliency including examples and options, and sustainable building codes and rating systems. Building principles are discussed in detail and considerations, references and resources are provided to help reserves think about how to incorporate sustainable principles into facility planning. Please note that the supporting material for this guidance is more robust than other plan elements because it also supports planning requirements for the NOAA Programmatic Framework for Considering Climate Change Impacts in Coastal Habitat Restoration, Land Acquisition and Facility Development Investments.

This plan should discuss the reserve's philosophy on sustainable building, purpose and description of existing facilities, facility challenges and gaps, and plans for new facilities, facility upgrades, and exhibits. Like the administration plan, facilities support reserve operations and reserve staff ability to meet objectives and actions within the strategic plan. Reserves may either choose to craft specific objectives for this plan that do not need to be incorporated into the strategic plan, or they may simply identify facility priorities. Either approach is acceptable, but there should be a clear link between facility plans and the achievement of reserve goals and objectives.

Plan Contents

A. Purpose of Facilities and Construction Philosophies

This section should describe the overall purpose and vision for what the facilities on the reserve campus will help achieve. Reserves may see themselves as centers for regional excellence in providing services; they may be local experts with a lower profile; and/or they may have facilities that showcase sustainable building approaches and practices. Green or sustainable building is the practice of creating structures and using processes that are environmentally responsible and resource-efficient throughout a building's life cycle from siting to design, construction, operation, maintenance, renovation and deconstruction. Building in this way reaps not only environmental, but economic and social benefits.

This section should describe the philosophies that the reserve ascribes to, as well as the state laws, regulations and initiatives that support sustainable building.

Questions to inform this section include: What are the values of reserve facilities to the staff and public? What are the general reserve philosophies around construction, operations and maintenance of reserves facilities? What state laws, regulations, and/or initiatives support sustainable building? What elements of sustainability are most important for the reserve to achieve?

B. Description of Current Facilities

This section should describe each facility on the reserve campus. Descriptions of stationary and traveling exhibits should be included.

Questions to inform this section include: What is the purpose of the facility? Where is it located? When was it constructed? What are the components within the facility (if applicable)? How is the facility used and by whom? Is there visitor use and capacity data to support these facilities? How does the facility employ sustainable building principles? Are there plans to upgrade the facility to improve sustainability and operational efficiency? If so, these should be described generally in this section, but more specifically in the "Planned Facilities and Facility Upgrades" section as appropriate.

A map should be included that identifies the location of all current facilities. Additionally, include photos of major facilities.

C. Facility Challenges and Gaps

This section should describe the projected challenges that facilities will face, whether that is from age, use, natural or anthropogenic stressors, including climate impacts, and provide a rationale and basis for new facility siting and upgrade priorities.

Questions to inform this section include: How old are the current facilities? Which ones are in need of repair? How old are the current systems within the building? What can be done to make them more efficient and supportive? What are the major stressors likely to affect facilities? Will increased precipitation, lake or sea level change, or frequency and intensity of storms be likely scenarios? Are facilities prepared for potential impacts?

This section should also describe the current facility gaps and needs as demonstrated through some form of needs assessment. These needs should be grounded in data – capacity, visitor use, functional needs, etc. – that identify the challenges, that if overcome, support the vision of the program and are consistent with elements of a standard reserve and sustainable reserve guidelines. (Dewberry Design, 2004) Much of this data may come from the needs and gaps information identified in the "Program Foundations" section.

Questions to inform this section include: What are the key programmatic technical and structural needs for reserve operations? What staff, visitor or stakeholder needs are not currently being met? What are the projected needs of those audiences? How can the reserve increase operational efficiency and reduce resources to meet those needs?

D. Planned Facilities

This section should describe the facility and/or facility upgrades that the reserve wants to undertake during the period of the management plan that meets the identified needs stated above. Detailed explanation of these facilities should include considerations for siting (if applicable), sustainable design principles, and climate change impacts. Please refer to information generated from the 'Introduction to the Reserve' component to inform development of this section.

1. Climate and Non-climate Stressors

In order to effectively plan for new facilities and/or the most appropriate facility upgrades, reserves need to consider siting for optimal sustainability, survivability and accessibility while also thinking hard about projected use and utility for staff and partners.

Questions to inform this section include: What are the major stressors likely to affect siting of new facilities? Will increased precipitation, lake or sea level change, or frequency and intensity of storms be likely scenarios? Will temperature ranges be shifting? What type of scenario planning has the reserve done to appropriately site new facilities? What are the results of that work? What are the projected uses and lifespan for the facility?

Hence, part of planning for future facilities, should include the following:

- Identification of the projected climate change impacts that will affect the investment. Stressors and their subsequent impacts that should be addressed include changes in precipitation, air temperature, change in sea level or lake level, and changes in storm frequency and intensity. Please refer to Appendix 6, Summary of Observed and Projected Regional Climate-related Changes, and Appendix 7, Summary of Climate Change Phenomena with Observed and Projected Changes, as well as local information relevant to understanding infrastructure sensitivity, exposure and/or vulnerability. Climate data and scenario tools focusing on sea level change can be found in the "Introduction to the Reserve" resources section as well as in Appendix 10, Planning for Sustainable Facilities.

- Identification of the life span of the project based on these scenarios and projected utility. It is the responsibility of project principals to identify the methods used to determine the life span of the project based on scenarios and expected utility of the structure. However, a 30 year life span is suggested for all major facilities.

- Gauging the extent to which the projected impacts will affect project objectives and benefits over the life span of the project. By reviewing all of the factors above, determine the risk and appropriate investment for long-term facility projects, as well as potentially shorter-term upgrades and improvements in existing facilities.

- Making determinations about the extent of the climate impacts over time based on one or more climate change scenarios. We advise applying a multi-scenario analysis based on recommendations outlined by the National Research Council, the U.S. Global Change Research Program, and the Intergovernmental Panel on Climate Change.

2. Facility Descriptions

Identify each project in order of priority and describe why the project is a priority for the reserve. In order to describe these projects accurately, pre-work and planning will likely be a necessity. If the reserve has already developed a facility master plan, please draw from this document. For each project describe the following:

- Purpose and estimated life of the facility.
- Sustainability goals, targets and evaluation mechanisms.
- Elements of the project that support Reserve System Sustainable Building Principles.

  Cost estimate for each proposed facility which include associated costs for environmental assessment, if applicable. An environmental assessment will need to be prepared if the project occurs on undisturbed land and/or if it is expected to have significant effects on the environment. Each project will be evaluated on a case by case basis.
- Description of associated signage and/or exhibits that describe the sustainable principles and features of the building if open to the public.
- Description of forecasted maintenance costs and state commitment to supporting these costs.

The Reserve System Sustainable Building Principles, adopted from "Guiding Principles for Federal Leadership in High Performance and Sustainable Buildings" set forth in the Federal Leadership in High Performance and Sustainable Buildings Memorandum of Understanding (2006), are discussed in detail along with examples in *Appendix 10: Planning for Sustainable Facilities*. With regard to addressing bullet three above, please refer to Appendix 10 which contains supporting information corresponding directly with the questions below related to each building principle.

Reserve System Sustainable Building Principles

- Integrated design and sustainable siting
- Water efficiency
- Energy efficiency
- Materials and resource conservation
- Indoor environmental quality
- Operational efficiency

Integrated Design and Sustainable Siting

All projects should employ a collaborative, integrated planning and design process that starts at the earliest stages of the design process, includes a variety of expertise relevant to each stage, and maintains an integrated project team throughout all stages of the project considering the life cycle of the project.

Questions to inform integrated design include: Will a collaborative integrated planning and design process be used? Will performance goals for the green principles be established for the project? What are there constraints to sustainable building? Are there local ordinances that will make this challenging?

The coastal zone presents a harsh environment for facilities and climate change will present new and exacerbate existing stressors. Projects should account for climate change impacts, as well as elements such as natural light, habitat preservation, stormwater, and factors affecting accessibility.

Questions to inform siting include: Are potential sites for future facilities at risk to climate impacts and/or natural hazards? Are potential sites for future facilities confined to the reserve buffer areas? What are the state and local considerations for reserve facility siting? Are you considering the full spectrum of lighting needs and impacts? How do you plan to protect existing native habitat or restore a site with native species? How do you plan to address stormwater discharges on the site? Are you considering implementing Low Impact Development (LID) practices for stormwater? Are you considering proximity to community features and transportation issues?

Mission-Aransas Reserve: Building Sustainably on the Texas Coast

In 2011, the Mission-Aransas Reserve celebrated the opening of its new Estuarine Research Center on the University of Texas Marine Science Institute campus. Several years in the making, the Reserve coordinated a collaborative approach bringing together an interdisciplinary team of engineers, architects and reserve staff to design and construct a headquarters and research facility to withstand harsh coastal conditions (i.e., high winds, salt, torrential rains and storm surges) and meet specific sustainability goals. Their first challenge was working within a culture where facilities development practices and norms did not necessarily incorporate green principles.

To address conditions on the coast, the facility is designed to sacrifice the ground floor housing non-critical building functions, an exterior rated to handle 130mph winds and using concrete additives to prevent chloride penetration to name a few. In addition, the grounds are being irrigated by air conditioning condensate and rainwater captured from the roof to reduce impacts on municipal water systems. During the construction, 83% of the construction waste was recycled and 82% of the materials used originated in Texas. Taken together, the project team incorporated sustainable design and construction practices that qualified for Leadership in Energy and Environmental Design (LEED) Silver certification.

Throughout the project, the reserve found that building sustainability with low carbon footprints is difficult to do on the coast. However, commitment from all the partners to sustainable designs and practices was critical to achieving a facility that is durable, versatile and sustainable. For more information, contact the Mission-Aransas Reserve.

Water Efficiency

Water is a precious commodity and given availability and infrastructure stressors, we must decrease the amount of water used and increase dependence on water that is collected, used, purified, and reused on-site. Try to employ water saving mechanisms as much as feasible.

Questions to inform water efficiency include: How will you incorporate xeriscaping? Are you being strategic in use of turf areas as part of the facility landscaping? How will you incorporate efficient irrigation systems and schedules? What water use reduction practices will you incorporate?

Energy Efficiency

Buildings in this country use a significant amount of energy most of which is produced from nonrenewable, fossil fuel resources which are contributing to greenhouse gas impacts. It is imperative that reserves reduce their energy demands. It is worth re-emphasizing an integrated project team since reducing energy demand requires a team including a variety of building experts to do this effectively.

Questions to inform energy efficiency include: How will you ensure an integrated planning team and process? How will you set energy efficiency targets and measure them? How will you reduce heating, cooling and lighting loads? How will you employ renewable or high–efficiency energy sources? How will you identify efficient HVAC and lighting systems? How will you reduce non-regulated energy consumption? How will you optimize system controls?

Great Bay Reserve: Stepping Out on Geothermal and Solar

The Great Bay Reserve broke new ground for the New Hampshire Public Works Department as the first state facility to install a geothermal system. Due to the department's lack of experience and the fact that they had to go with the lowest bidder who then subcontracted out various parts, the system was delivered with multiple challenges which required time and money to fix. A key lesson here is to do as much homework as possible to make up for the experience your agency may lack. While states must follow certain contracting rules, at a minimum, try to ensure that there is one company, ideally one with local expertise, to manage the entire project to ensure a seamless product and installation. On the flip side, the solar roof was a great success because they hired a local contractor who designed and installed the system. The bid process was a success as well since they bid for solar with a roof component vs. bidding for a building with a geothermal component. The reserve is already seeing about 20% energy saving. The roof is projected to last about 40 years, almost twice that of an asphalt roof. Beyond energy and materials savings, staff and visitors love coming to a green building. For more information, contact the Great Bay Reserve.

Materials and Resource Conservation

Preventing and recycling waste reduces depletion of natural resources, creates less pollution by reducing manufacturing and transportation-related emissions, uses less energy and water compared to many virgin material product manufacturing processes, and reduces greenhouse gasses by using less energy for manufacturing and transportation. It is important to purchase products and employ processes that do not pollute or unnecessarily contribute to the waste stream, do not adversely affect health, and do not deplete limited natural resources.

Questions to inform material and resource conservation include: Do you have a plan for managing construction waste? Have you evaluated environmental trade-offs for materials and resources? Have you considered recycled materials and deconstruction assemblies as much as possible? Have you considered using renewable, locally produced and low energy materials to the full extent possible?

Indoor Environmental Quality

Indoor environmental quality encompasses indoor air and water quality, aesthetics, ergonomics, acoustics, lighting, and electromagnetic frequency levels. It is important to value decisions about these items and engage building occupants in making these decisions, as well as allow for personal control of these items where practicable.

Questions to inform indoor environmental quality include: How will you achieve a comfortable and healthy air and water quality for occupants? How will you reduce pollutants inside the facility? How will you ensure a productive work environment?

Operational Efficiency

Operational Efficiency will be a direct result of taking all other sustainable building principles into account for new buildings. a whole building design approach ultimately yields the best returns in reduced impact to the environment, efficient operation, and effective work environment.

Questions to inform operational efficiency include: Have you identified operational efficiency targets, especially for energy and water efficiency? Have you created a schedule for assessing those targets? Have you developed an operations and procedures manual so that systems can be cared for appropriately? Have you identified personnel to monitor and maintain the facility?

E. Facility Upgrades

All reserves should try to evaluate where sustainability can be improved for each facility on the reserve campus. Where possible, audits to assess water and energy inefficiencies should be performed to understand usage and options for minimizing usage. This information should directly inform efforts to address the Reserve System sustainable building principles.

Questions to inform this section include: What are the most significant energy and water sinks at the reserve? What actions can be implemented to reduce energy and water usage? What actions can be taken to address the other sustainable building principles, including exterior work associated with landscaping/xeriscaping? What are the sustainability goals and targets for these specific upgrades? How will the reserve evaluate the efficacy of the improvements over time? How will the reserve maintain upgrades and ensure systems and improvements remain efficient?

F. Exhibits

Reserve exhibits provide important passive and active learning opportunities for a variety of visitors about the dynamic processes and benefits of estuaries, as well as the pressures they are under and what the public can do to protect these resources. Exhibits should be theme based, address reserve priority issues, and convey the reserve's key messages. Exhibits should be evaluated periodically to determine how to incorporate new information and best engage audiences.

This section should include a general description and cost estimate for new exhibits and/or exhibit upgrades based on some form of needs assessment. When possible, use sustainable materials, and where applicable discuss sustainable building principles.

Additionally, interpretive materials and signage can be found both inside facilities as well as outside within demonstration sites, land trails, water trails, amphitheaters, etc. Consider the range of experiences available to visitors, and provide description of planned outdoor interpretive materials and/or exhibits. Cost estimates should be included and these activities should also be based on projected visitor use needs and impacts.

References

Dewberry Design Group Incorporated (2004) National Estuarine Research Reserve System Standard Reserve

Dewberry Design Group Incorporated (2004) National Estuarine Research Reserve Sustainable Design Guidelines

Note: a full suite of references, tools, and resources can be found in Appendix 10 regarding building codes and standards, climate change tools, and sustainable building principles.

Land Acquisition Plan

About This Section

The land acquisition plan is a required element of a management plan, per the Federal Code of Regulations, 15 CFR 921.13. Estuaries, and their associated habitats, offer numerous and diverse benefits to society and natural systems. Some of these benefits include storm buffers to protect property from hurricanes; nurseries for commercially important marine species; areas for to enjoy for recreation and aesthetics. However, human development has significantly eliminated or degraded the habitats that provide those societal values. to address the conservation of coastal habitats, the U.S. Commission on Ocean Policy in 2004 recommended that each state identify priority coastal habitats and develop plans, in partnership with willing landowners, federal agencies and others, for coastal and estuarine land conservation.

NOAA supports this recommendation through several acquisition investment tools under the Coastal Zone Management Act of 1972, as amended, including the Coastal Resource Improvement Program authorized under Section 306A, the Coastal and Estuarine Land Conservation Program under Section 307A, and the Reserve System Land Acquisition and Construction Program under Section 315. Each of these programs provides an opportunity to conserve coastal habitats.

This plan should identify ecologically key land and water areas for acquisition, prioritize these areas according to their relative importance for specific values, and describe strategies for establishing adequate long-term state control over these areas.

Plan Contents

A. Acquisition Values

This section should describe the reserve's acquisition values. It is helpful to understand these values as they form the basis of an acquisition plan. Essentially, the reserve should identify those ecological, historical, conservation, cultural, recreational, and other values that are important when considering future acquisitions. These values should be connected to the reserve's management plan goals and objectives.

Questions to inform this section include: What broad acquisition values are important to the reserve? Do the acquisition values match the reserves' management goals and objectives? Has the reserve considered non-ecological values?

B. Priority Acquisition Areas

This section should describe priority areas targeted for potential future acquisitions. To support the identification of these priority areas, the reserve must include a description of the criteria used to prioritize areas, the prioritization process used, and any additional factors that influenced the selection of these areas. These areas do not need to be at the parcel level, but at a level appropriate for the reserve.

1. Descriptions of Priority Acquisition Areas

The description of each priority area should include key habitats, existing ecological value, and proposed value to the reserve's ecological unit and/ or programming. A map should be included of all acquisition areas, within the context of the reserve boundary to understand if priorities are contiguous and/or connected to the reserve via water corridor. Each target acquisition area description must be sufficient to reference when developing potential land acquisition grant applications.

Questions to inform this section include: Are the acquisition areas adjacent to existing reserve boundaries (core or buffer)? Is there sufficient existing information available to describe each area? What are the key habitats within each area? How are these areas contributing to protecting and/or enhancing the ecological unit and/or programming at the reserve? Does the reserve have the capability to produce high quality maps of the areas? What key values are supported through the targeted areas?

Optional Elements for Priority Acquisition Areas the reserve could enhance their priority area descriptions by including maps of important non-ecological acquisition values within priority areas. This supporting visualization could identify important cultural resources; access pathways, consumptive and non-consumptive recreation uses, historic structures, education potential, etc.

2. Prioritization Process and Criteria

It is optional for the reserve to describe the prioritization process used to identify and rank the acquisition areas. Key to this process is the identification of ranking criteria. The criteria developed by a reserve should incorporate climate and non-climate factors into the prioritization process. These criteria are typically created by the reserve staff with input from partners and the reserve advisory board and are linked tightly to objectives within the reserve strategic plan. Benefits of creating criteria include:

Land Acquisition Plan

__ Reserve Acquisition Values ♦
__ Priority Acquisition Areas
__ Description of acquisition areas
__ Map of acquisition areas
__ Prioritization process ♦
__ Climate and non-climate stressors
__ Map of non- ecological acquisition values within priority areas ♦
__ Priority Areas Acquisition Strategy
__ Tract acquisition strategy
__ Tract ecological and/or programmatic values
__ Preferred methods for establishing state control
__ Fair market value estimates
__ Potential acquisition partners♦
__ Funding sources ♦
__ Estimated acquisition timeline
__ Map detailing land uses on public and private tracts outside the reserve boundaries ♦
__ Management and/or stewardship considerations for acquisition priorities ♦
__ Description of collaborative process used in joint acquisition projects ♦

- Help reserve managers, staff and partners visualize the conservation priorities
- Provide a strategic approach to conserving ecosystem functions and services
- Improve ecosystem and community resilience to climate and weather impacts
- Leverage partners in support of reserve priorities
- Improve the management of investment risks

Questions that inform this section include: Has the reserve identified a process or strategy for acquiring new areas? What ranking criteria does the reserve use for prioritizing acquisition areas? Is the prioritization process linked to the reserve management plan or other conservation priorities within the state? Has the reserve sought the input of the Reserve Advisory Board or other stakeholders? Has the reserve developed criteria that account for climate and non-climate factors?

3. Factoring Non-Climate and Climate Stressors into Acquisition Planning

Historically, acquisition planning looked at a variety of anthropogenic and natural stressors to support the prioritization process. Given the limited resources of states and land trusts, this process is useful in identifying targets of future land conservation investments. Some of the types of stressors considered in the past include the threat of development, invasive species, land zoning, etc. Climate-related stressors have not been commonly factored into this process.

in 2010, OCRM and the Office of Habitat Conservation jointly developed the NOAA Programmatic Framework for Considering Climate Change Impacts in Coastal Habitat Restoration, Land Acquisition and Facility Development Investments, which identifies a framework for considering climate change impacts in planning and decision-making for coastal investments in restoration, facilities development and land acquisition. This framework provides that new or updated acquisitions plans, that are part of reserve management plans, must integrate climate considerations.

Reserves should create a set of climate considerations or criteria that are reflected in the prioritization of acquisition areas. Climate-related criteria developed by the reserve should be applied equally to the prioritization process rather than outweighing other values or factors. When factoring in climate stressors the reserve should also consider short and long-term impacts. Some examples of climate stressors used to develop criteria might include changes in relative sea or lake levels; changes in storm intensity, and changes in precipitation patterns. (*Coastal and Estuarine Land Conservation Program Guide, 2011*)

Example Climate Stressor-Impact Links for Acquisition

Stressor	Short-term Impact	Long-term Impact
Sea Level Rise	↑ Inundation, ↑coastal erosion, Δ salinity, functional Δ in habitats	disappearance of habitats, Δ species diversity, functional Δ in habitats, habitat migration
Storm Intensity	↑ storm surge, ↑coastal erosion	damage to key habitats, Δ species diversity
Storm Intensity	↑↓drought, Δ salinity, Δ sediment and pollutant loadings, ↑flooding	Δ water quality, Δ species diversity, functional Δ in habitats

In addition to impacts, reserves should value any potential ecological benefits derived from climate stressors. Benefits could include creating habitat migration corridors, creating a refuge for sensitive species, and buffering for storms.

When identifying and describing climate and non-climate stressors, consider the following questions to inform this section: What climate stressors are most relevant to the reserve? What are the potential short and long-term impacts linked to the stressors? How will already identified acquisition priorities be impacted by climate stressors? How can the reserve maintain the ecological unit with key acquisitions? Are there other climate change planning documents applicable to the reserve acquisition plan? What adaptive benefits or values are important to the reserve when addressing climate impacts? What climate criteria are considered in the prioritization of acquisition areas?

Example of Prioritization Criteria for Climate Change Considerations Include:

- Degree of sensitivity of the area to locally relevant climate change impacts
- Impact to area's primary acquisition values
- Resilience of the area to climate impacts that could include:
  - Connectivity of habitats to allow for species migration
  - Protect key ecosystem features that play a significant role in maintaining system functions and natural processes
  - Conserve habitat and species diversity
  - Reduce anthropogenic stressors to existing habitats and conservation values
- Exposure to climate impacts over time. This could mean a 30 year time horizon but ideally a 50 or 100 year time horizon should be considered.
- Elevation, especially important in coastal areas impacted by sea level change

What non-climate stressors are most relevant to the reserve? What are the potential short and long-term impacts linked to the stressors or threats? How will already identified acquisition priorities be impacted by these stressors? What adaptive benefits or values are important to the reserve when addressing non-climate impacts? What non-climate criteria are considered in the prioritization of acquisition areas?

Example of Prioritization Criteria for Non-climate Considerations Include:

- Immediate threats of development
- Impact to area's primary acquisition values
- Resilience of the area to anthropogenic impacts that could include:
    - Connectivity of habitats to allow for species migration
    - Protect key ecosystem features that play a significant role in maintaining system functions and natural processes
    - Conserve habitat and species diversity
- Exposure to invasive species impacts over time
- Existing zoning practices
- Visitor uses impacts

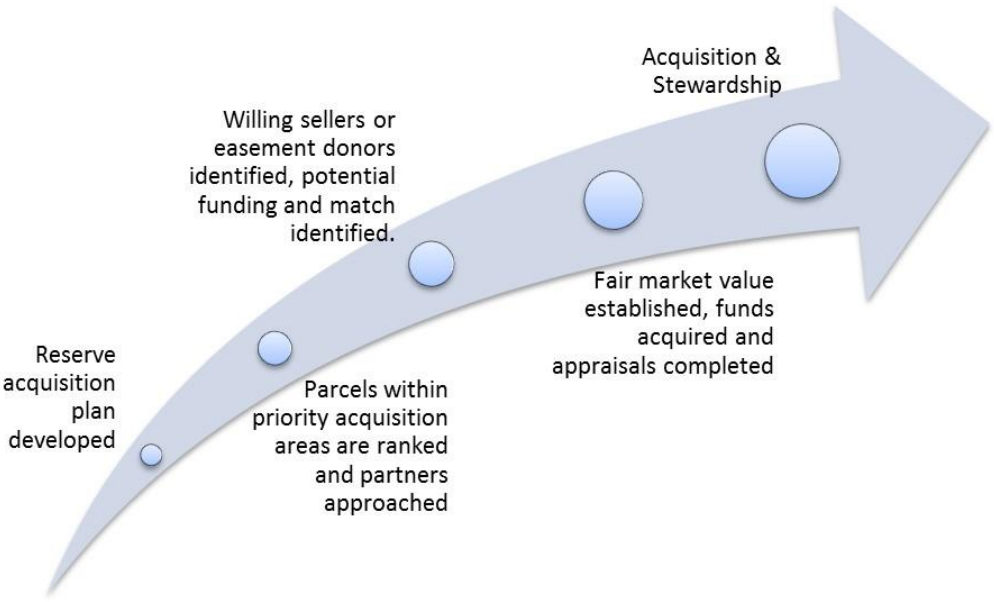
C. Priority Areas Acquisition Strategy

Once priority acquisition areas have been established, the reserve should consider how it will acquire lands and waters within an acquisition area. Tracts within larger areas identified should be identified to the best of the reserve's ability. Ranking priority tracts targeted for acquisition provides reserves the opportunity to efficiently allocate limited acquisition resources to land or waters that best support ecological functions and/or programmatic goals and objectives laid out in the management plan. A table or list of the ranked areas should be included in the plan.

The reserve should describe the strategy or process used for establishing long-term protection to ensure a stable environment for research and education within acquisition areas. These strategies may be stated generally as they may be applied to all acquisition areas; however, if knowledge of a particular strategy is applicable to specific smaller areas or tracts, then that should be identified. If applicable, any required state level acquisition strategies should be described in this section.

It will also be important to understand how these acquisition strategies are consistent with federal and state requirements and processes, as well as if acquisition projects are consistent and complementary to other federal and state acquisition program plans, e.g. Coastal and Estuarine Land Conservation Plans. The coordination with the state Coastal and Estuarine Land Conservation Program plan should be specifically discussed, as well as coordination with other relevant conservation plans linked to reserve land- owning partners.

> *Note: the reserve may choose to not identify specific parcels to target for future acquisition under the plan. These parcels can be grouped together into tracts or subareas for the purpose of creating an acquisition strategy. In most cases, reserves choose not to identify targeted parcels due to local considerations.*



For each ranked priority area, and if possible, the tracts within the larger area, the following should be identified and described:

- Acquisition strategy
- Ecological and/or programmatic values
- Preferred method for establishing state control should
- Fair market values within acquisition areas
- Potential acquisition partners
- Potential funding sources
- Acquisition timeline; and other supporting information, as applicable

Questions to inform this section include: Has the reserve discussed pros and cons of various processes or strategies for acquiring new tracts/areas? Does reserve staff understand different mechanisms for acquisition? Has the reserve considered the subsequent stewardship of areas and parcels targeted for acquisition? What is the reserve's timeline for acquisition of selected priority areas within a 5-year timeframe? How does "core" verse "buffer" impact acquisition planning? Who are the reserve's potential partners or sources of match for acquisition projects?

1. Tract Acquisition Strategy

The reserve should briefly describe the strategy or process used for establishing long-term protection to ensure a stable environment for research and education. Various strategies may be of value; for example, reserves could focus at a landscape scale (i.e. Green Infrastructure) or use a threat-based approach, using reserve stressors like land conversion or development as a key attribute.

2. Tract Ecological or Programmatic Values

The reserve should describe the ecological or programmatic values for the tracts within each prioritized area, or per area as applicable. Identifying these values for individual tracts will help the reserve rank tracts for future acquisition opportunities.

3. Preferred Methods for Establishing State Control

According to Reserve System regulations, a reserve must establish adequate state control over new areas acquired for inclusion into the reserve boundary. Specifically, per 15 CFR 921.13:

> In selecting a preferred method(s) for establishing adequate state control over areas within the proposed boundaries of the reserve, the state shall perform specific steps for each parcel determined to be part of the key land and water areas (control over which is necessary to protect the integrity of the Reserve for research purposes), and for those parcels required for research and interpretive support facilities or buffer purposes.
>
> **(A)** Determine, with appropriate justification, the minimum level of control(s) required [e.g., management agreement, regulation, less-than-fee simple property interest (e.g., conservation easement), fee simple property acquisition, or a combination of these approaches]. This does not preclude the future necessity of increasing the level of state control;
>
> **(B)** Identify the level of existing state control(s);
>
> **(C)** Identify the level of additional state control(s), if any, necessary to meet the minimum requirements identified in paragraph (a)(7)(i)(a) of this section;
>
> **(D)** Examine all reasonable alternatives for attaining the level of control identified in paragraph (a)(7)(i)(C) of this section, and perform a cost analysis of each; and,
>
> **(E)** Rank, in order of cost, the methods (including acquisition) identified in paragraph (a)(7)(i)(D) of this section.(ii) an assessment of the relative cost-effectiveness of control alternatives shall include a reasonable estimate of both short-term costs (e.g., acquisition of property interests, regulatory program development including associated enforcement costs, negotiation, adjudication, etc.) and long-term costs (e.g., monitoring, enforcement, adjudication, management and coordination). In selecting a preferred method(s) for establishing adequate state control over each parcel examined under the process described above, the state shall give priority consideration to the least costly method(s) of attaining the minimum level of long-term control required.

As a result, the reserve will need to identify the method(s) or mechanism(s) of acquisition which the state proposes to use to establish adequate long-term state control over areas targeted for acquisition. Some of the acquisition mechanisms potentially available to reserves include:

- Fee Simple – absolute title to land, free of any conditions, limitations, restrictions, or other claims against the title, which one can sell or pass to another by will or inheritance. A fee simple title has a virtually indefinite duration.

- Conservation Easement – a legal agreement between a landowner and a land trust or government agency that permanently limits uses of the land in order to protect its conservation values. It allows landowners to continue to own and use their land, and they can also sell it or pass it on to heirs. Examples of acquired easement rights include riparian, subsurface mineral, agricultural, residential development, viewshed, and groundwater.

- Donation – an outright donation of land to a trust or federal, state, or local governments that may provide the donor with a charitable income tax deduction and a reduction in the value of one's taxable estate.

Mission-Aransas Reserve: Stewardship Considerations at Fennessey Ranch

As part of the designation of the Mission-Aransas Reserve in 2006, a conservation easement was acquired on a private working ranch that allows multiple uses including hunting, fishing, nature tours, and cattle ranching, among others. Supporting these diverse business ventures, the ranch includes diverse habitats from freshwater wetlands, riparian corridors and coastal prairie. All these habitats support a wide range of fauna and flora, including over 400 species of birds.

The conservation easement provides the legal foundation for the collaborative management of the property between the reserve and the property owners. a joint management plan was developed that allows for the generation of revenue from compatible uses and ensures that the conservation values of the ranch will continue to support wildlife, biodiversity, as well as, reserve research and education opportunities well into the future. For more information: *www.missionaransas.org*

4. Fair Market Value Estimates

Reserves should look at the fair market value of any property interest within the prioritized acquisition areas. Ownership and fair market values of tracts can be stated in general terms within the plan. It is recommended that individual tract ownership not be identified.

5. Potential Acquisition Partners

If feasible, the reserve can identify potential acquisition partners. These could include a variety of interested local, regional, or national land trusts (e.g., the Conservation Fund, the Nature Conservancy, Weeks Bay Foundation, the Elkhorn Slough Foundation), state land management agencies, municipalities, local governments, and reserve Friends groups. Partners can be valuable assets to a reserve by

providing real estate expertise, conducting property appraisals, contacting willing sellers, offering financial and legal assistance, and monitoring easement properties among others.

Weeks Bay Reserve: Leveraging Partners to Acquire Land

In 2010, a diverse partnership secured the acquisition of 820 contiguous acres of forested wetland habitats adjacent to the Weeks Bay Reserve. A diverse coalition comprised of the Conservation Fund, Weeks Bay Foundation, Baldwin County Commission, Alabama Forever Wild through the Alabama Department of Conservation and Natural Resources (ADCNR), and the National Oceanic and Atmospheric Administration (NOAA) contributed to the success of the project.

To acquire the property for conservation purposes, ADCNR brought together funding from different sources including NOAA, Forever Wild, and Coastal Impact Assistance Program. Working with ADCNR, the local and national land trusts became the contracting entity with the willing seller. In that role, they researched the title and completed an appraisal of the property. Without the contributions of the various partners, the reserve would have not been able to acquire property. The resulting federal, state, local and land trust partnership has made a significant contribution to the conservation of coastal habitats and contributes to improved public access, water quality, and opportunities for research and education. These partnerships led to the largest addition to the reserve since its designation in 1986.

6. Funding Sources

If feasible, the reserve can identify potential sources of acquisition funds. These could include potential sources of matching funds. Funding sources could be federal, state, foundation, or private. Common examples of funding sources are provided in the tools and resources section.

7. Estimated Acquisition Timeline

The plan should include a schedule estimating the time required to complete the process of establishing adequate state control over parcels within priority acquisition areas.

Optional Elements Supporting Priority Area Acquisition Strategy
The Reserve could enhance their priority area descriptions by including optional maps detailing the range of land uses on public and private parcels within the reserve watershed and priority acquisition areas. Looking towards the future, the reserve should detail some of the potential management and stewardship considerations for areas or tracts post-acquisition. These management considerations should link to the reserve's management plan and restoration plan (if applicable). In addition to looking at potential partners, the reserve could also detail the collaborative process it plans to implement with those partners for joint acquisition projects.

References

National Oceanic and Atmospheric Administration (May 2010). Programmatic Framework for Considering Climate Change Impacts in Coastal Habitat Restoration, Land Acquisition, and Facility Development Investments.

U.S. Commission on Ocean Policy (2004) *an Ocean Blueprint for the 21st Century - Final Report*. Washington, DC, 2004. ISBN#0–9759462–0–X

Tools and Resources

NOAA's Habitat Priority Planner: a GIS tool to help identify and prioritize areas for conservation, restoration, and planning.

NOAA's Sea Level Rise and Coastal Flooding Impacts Viewer shows how various levels of sea level rise will impact coastal communities. The current project areas include Mississippi, Alabama, and parts of Texas and Florida, with additional coastal counties to be added in the near future. Visuals and the accompanying data and information cover sea level rise inundation, uncertainty, flood frequency, marsh impacts, and socioeconomics.

Funding Opportunities

U.S. Department of Agriculture - Forest Legacy Program: Grants available to help landowners, state and local governments, and private land trusts identify and protect environmentally important forest lands that are threatened by present and future conversion to non-forest uses. The Forest Legacy Program is designed to assure that both traditional uses of private lands and the public values of America's forest resources are protected.

U.S. Fish and Wildlife Service's North American Wetland Conservation Act Program: Grants are available to fund conservation of wetlands and wetland-dependent fish and wildlife (waterfowl) through acquisition, restoration and/or enhancement. Grants may be provided directly to state, local governments, and non-profit organizations. This program strongly prefers to fund diverse conservation partnerships.

U.S. Fish and Wildlife Service's Coastal Wetland Grant Program: Grants are awarded to Great Lakes and coastal states and trust territories for projects that restore, acquire, manage, or enhance coastal lands and waters. Projects must provide for the long-term conservation of such lands and waters and the fish and wildlife dependent on them. The Coastal Grants Program gives priority to the restoration of barrier islands associated maritime forest, coastal wetlands ecosystems, endangered species, anadromous fish species and to the building of financial and cooperative, private, and governmental partnerships.

U.S. Fish and Wildlife Service's Endangered Species Recovery Lands Program: Grants are provided to states and territories for acquisitions of habitat that support approved recovery plans.

Natural Resources Conservation Service (NRCS) Grant Programs: The NRCS has a number of cost-share/grant programs that involved acquisition of conservation easements including the Conservation Reserve Program, Wetland Reserve Program, and Conservation Reserve Enhancement Program. The Wetland Reserve Program provides technical and financial assistance to eligible landowners to address wetland, wildlife habitat, soil, water, and related natural resources concerns on private lands in an environmentally beneficial and cost-effective manner. The program provides an opportunity for landowners to receive financial incentives to enhance wetlands in exchange for retiring marginal land from agriculture. This program involves the establishment of permanent or 30-year conservation easements or restoration cost-share funds.

NOAA's Coastal and Estuarine Land Conservation Program: Grants to state and local governments to purchase significant coastal and estuarine lands, or conservation easements on such lands, from willing sellers.

NOAA's National Estuarine Research Reserve System PAC (Procurement, Acquisition, and Construction): Grants to state host agencies of reserves to support land acquisition for projects identified in approved reserve management plans.

Resource Manipulation Plan

About This Section

The resource manipulation plan is an optional element of a management plan, per the Federal Code of Regulations, 15 CFR 921.13, and should be included when resource manipulation activities are occurring within the buffer areas of the reserve. Resource manipulation can occur only in the reserve buffer and refers to long-term pre- existing (prior to designation) manipulation for reasons not related to research or restoration. Most often resource manipulation is occurring for the benefit of human communities. Examples of resource manipulation activities include regulation of water flow, sediment management, timbering, or aquaculture. These activities should be reviewed to ensure they are not preventing the reserve from serving its designated purpose.

Resource Manipulation Plan
(Optional)

__ Current and proposed resource manipulation activities
__ Map of manipulation activities
__ Permitting/approval requirements
__ Climate and non-climate stressors
__ Current and potential partners
__ Impacts of activities

This plan should identify and describe priorities for resource manipulation, influence of stressors on these activities, requirements for conducting them, justification for continuing them, and resources and partners devoted to them.

Plan Contents

Current and Proposed Resource Manipulation

This section should describe the reserve's current or planned resource manipulation activities. Each activity, current or planned, should generally support the reserve's management plan goals and objectives and not create any negative impact to resources. In addition, expected outcomes of the resource manipulation activities should be described generally. Outcomes could be ecological, social, or economic in nature and should not be detrimental to the ecology of the reserve. Given that reserves have limited resources, the reserve should prioritize what activities they will implement or continue over the 5-year management planning period.

The reserve should justify why the current and planned resource manipulation activities are useful and/or at minimum, not detrimental to reserve resources. It will be helpful to reference local, state, or federal priorities or plans that support these activities and are important to the reserve. A reserve boundary map should be provided that spatially references the current and planned resource manipulation activities and key resources or habitats important to these manipulations.

Question to inform this section include: What are the reserve's current or proposed resource manipulation activities? How are the activities identified connected the reserve's management

plan goals and objectives? What are the priorities for the reserve and why? What are the potential benefits of conducting resource manipulation activities? At what scale are these manipulations occurring? What local, state, and/or federal authorities or priorities support current and proposed resource manipulation activities?

1. Factoring Non-Climate and Climate Stressors into Resource Manipulation Planning

The reserve should consider stressors that may impact resource manipulation activities, including climate considerations that factor into prioritizing these activities. When available, incorporate downscaled climate model information and other climate trend information to support the prioritization process. Incorporating these considerations into the prioritization process will help the reserve create a matrix of place-based climate-related impacts to reserve resources or habitats associated to resource manipulation activities.

Questions to inform this section include: What climate stressors could impact resource manipulation activities? Are these impacts beneficial or harmful to key reserve resources or habitats? Will resource manipulation activities enhance resilience to climate stressors?

2. Current and Potential Partners

Briefly identify reserve partners that support current or planned resource manipulation activities. Partners may be key players in achieving successful activity outcomes.

3. Permitting or Approval Requirements

The reserve should briefly describe any permits or other regulatory or administrative requirements for resource manipulation activities within reserve boundaries. Permits or regulatory requirements will vary based on each activity. An example of a permit could include an incidental take permit issued by the U.S. Fish and Wildlife Service (USFWS) for certain species.

Questions to inform this section include: Have you contacted regulatory officials within your state or county to inquire about permitting requirements for resource manipulation activities. If the reserve is not the primary party responsible for land stewardship or management, have those entities been included in the development of the proposed activity? What state and federal permitting or regulatory requirements apply to current and proposed manipulation activities?

4. Impacts of Resource Manipulation Activities

When resources are manipulated by human activity, opportunities exist for unintended ecological disturbance. These activities should be closely monitored for intended and unintended consequence to ensure that key reserve resources are protected.

Questions to inform this section include: Do the manipulation activities have the potential to negatively impact key land and water areas or habitats? Are resource manipulation activities occurring in areas considered for core area expansion? How will the reserve monitor these activities and their impacts?

Restoration Plan

About This Section

> **"Here is the means to end the great extinction spasm. The next century will, I believe, be the era of restoration in ecology."**
>
> – E.O. Wilson

The restoration plan is an optional element of a management plan, per the Federal Code of Regulations, 15 CFR 921.13. Most reserves have habitats that are in less than pristine condition due to land use and/or climate-related impacts. Restoration offers the opportunity for reserves to return habitat to its natural functioning, and in doing so, inform the practice of restoration through a hypothesis- driven restoration design. Restoration planning should take advantage of the full suite of reserve programmatic capability to the extent possible and address climate and anthropogenic stressors in considering the resilience, and hence prioritization, of restoration activities. Within the Reserve System, reserves span the spectrum of restoration needs from relative intact systems with no readily apparent need for restoration, to those altered where restoration may be the only way to achieve original function. The level of detail and priorities identified in this plan will depend on where a reserve is along this continuum.

This plan should describe restoration priorities, process for determining those priorities, influence of stressors on the priorities, project details (if available), and a monitoring strategy. Background on restoration ecology and the Reserve System Restoration Science Strategy is provided as context for the plan contents section.

What Is Restoration Ecology?

Restoration ecology is the scientific study and practice of renewing and restoring degraded, damaged, or destroyed ecosystems and habitats in the environment by active human intervention and action, within a short time frame site using targeted actions to achieve relatively self-sustaining ecological conditions. The Society for Ecological Restoration defines ecological restoration as an "intentional activity that initiates or accelerates the recovery of an ecosystem with respect to its health, integrity and sustainability." (Society for Ecological Restoration, 2004) the practice of ecological restoration encompasses a wide scope of projects such as restoration of hydrology, regarding, shoreline erosion control, reforestation, local seed sourcing, removal of non-native species, re-vegetation of disturbed areas, stream bank modifications, reintroduction of native species, as well as habitat and range improvements for targeted areas within reserves.

What Is Restoration Science in the Reserve System?

in 2002, a multi-disciplinary group of Reserve System staff and outside restoration experts developed a Restoration Science Strategy that takes advantage of the unique capabilities of the Reserve System within individual reserves and the system. The goal of the strategy is to "provide the scientific bases and technical expertise to restore, enhance, and maintain estuarine ecosystems by developing and transferring effective approaches to identify, prioritize, restore, and monitor degraded or lost coastal habitat."

The strategy identifies a number of overarching restoration-related questions that the Reserve System is poised to address through an inquiry-based approach to restoration. Questions posed by the plan include:

Once habitats and functions of value in estuaries are degraded, is this reversible and how? Can these functions be reversed to a pre-existing condition; are all functions restorable? When is rehabilitation to another type of habitat more appropriate than restoration?

What is the importance of topographical complexity to restoration? What is the relationship between topographical complexity and biodiversity? What is the relationship between habitat structure and function?

What do you monitor at an individual reserve that would help measure the cumulative benefit of many restoration projects? How long should projects be monitored to ensure long-term success? What steps should be involved in restoration projects? What level of effort is appropriate? What are the trade-offs between tremendous effort up front and small efforts over a longer period of time?

Additional considerations include ecosystem services. Considering the value of coastal resources and potential climate impacts and other stressors effects on these values, how can ecosystem services be maintained or enhanced to increase resilience of habitats and communities? What services are most beneficial to the reserve and surrounding natural and human communities? How will climate impacts generally be factored into restoration decisions?

The strategy promotes collaboration among reserves to address many of these questions and hence, contribute to scientific literature and policy development. The Reserve System can play a national role by developing innovative technology and methods of evaluating restoration performance, serving as local reference sites, translating and transferring restoration information, providing scientific and technical advice to support policy and regulatory decisions, and building support for regional science coordination. A reserve's restoration plan should not only focus on restoring habitat in the reserve, but explore what role(s) the reserve's restoration or other on-site capacity can play in promoting the priorities of the Reserve System Restoration Strategy.

Reserves should follow the guiding principles for restoration set forth within the strategy:

- Preservation and conservation of existing habitat must occur along with restoration
- Reserve participation is voluntary and additional funding is required for implementation
- Reserves will not support habitat manipulation that causes adverse impacts
- a partnered approach with science and management organizations or professional
- Integrated application of research, education, and stewardship capacities
- Science activities will be subject to a peer review process

Plan Contents

A. Priority Restoration Areas

1. Description of Restoration Areas

A description of each priority habitat identified for restoration should be included which indicates why the restoration is needed to protect and maintain the ecological unit of the reserve. Additionally, the ultimate ecological condition, or general outcome, of each area should be described. A map should be included of all areas targeted for restoration. Refer to the Reserve System habitat classification system as appropriate to describe current and project future habitat states.

Restoration Plan
(Optional)

__ Priority restoration areas
__ Description of restoration areas/habitats
__ Map of restoration areas
__ Climate and non-climate stressors
__ Prioritization process and criteria
__ Priority restoration projects
__ Acres and outcomes
__ Partners
__ Monitoring and evaluation strategies ♦

Questions to inform this section include: What habitats are most important to restore to ensure the integrity of the reserve's ecological unit? What are regional or national restoration-related science questions that can be informed by an inquiry-approach to restoration projects at the reserve? What restoration projects could inform broader stakeholder and/or partner needs? Is restoration to a pre-existing state obtainable and sustainable, or should manipulation to a new condition more sustainable?

2. Factoring Climate and Non-climate Stressors into Restoration Planning

When prioritizing restoration areas it will be important to develop criteria that help the reserve identify those areas most important to ensuring the integrity of the reserve's ecological unit. As part of this prioritization process, it will be important to factor climate and non-climate stressors into the process to determine timing and challenges for restoration efforts. Reserve understanding of anthropogenic drivers on their reserve habitats and ecosystems varies considerably. In some cases, a reserve may have the ability to control those impacts or stressors. In those instances, the reserve should incorporate controls in project designs. Some potential stressors to consider include land use impacts such as sediment and nutrient loading, as well as physical barriers to habitat migration such as dams, roads, and levees.

Questions to inform this section include: What stressors will impact the success and resilience of reserve habitats identified to be restored? Has the reserve considered climate impacts such as change in local sea level, inundation patterns, temperature changes, soil moisture changes, precipitation patterns, and storm intensity/pattern changes?

3. Determining Restoration Priorities

Given limited resources, it will be important to determine what criteria and process are in place to prioritize restoration activities. It is advised that the plan outline the process the reserve will take to develop and apply identified criteria for determining restoration priorities. Criteria can be ecological and logistical in nature.

For example, the reserve may want to consider ecological criteria that address the following questions: Are there threatened and endangered species that need to be protected? Are there needs to buffer resources from storm surge? Are there rare fauna or flora communities that need to be protected? What areas are important for ensuring habitat resiliency in the face of key climate and anthropogenic stressors? Is there any information lacking that would impede restoration success?

The reserve may also want to factor in logistical criteria that address the following questions: Is there available funding to conduct the project and ensure maintenance and monitoring? Can permits be obtained? Are partnerships required to ensure project success? Are those partners committed to the project? Are volunteers integral to the success of the project?

B. Priority Restoration Project Planning

Where enough detail is available, it is advised that project level information be included to leverage funding opportunities and share ideas with partners. Basic details for each project should include a description of the project, the intended outcome, the affected acreage, partners involved, monitoring strategy, and a site map noting the area to be restored in the context of the reserve boundary. Additionally, please note how local and/or regional policy makers, scientists, and/or restoration practitioners have been or will be involved in the design, and/ or implementation of the project. To the extent possible, restoration projects should include a restoration science element that links to the Reserve System Restoration Science Plan. A restoration science element may include reference site data and/or restoration-specific questions that can be examined within the context of the restoration project.

Please describe how reserve programs and assets will support the project; note how System-Wide Monitoring Program data will be used, and how CTP and education program staff will be involved in project development, communication of results, and/or resulting best management practices.

Reserves may also be engaged in projects by serving as a reference site and not an active area for restoration. Please note where this is occurring and if restoration practitioners in the area are using SWMP data.

C. Monitoring and Evaluation Strategies

In order to effectively monitor and evaluate the success of restoration habitats, consider the following questions: Has habitat function and structure been established to meet targets? Has biodiversity been established to meet targets? What are the long-term monitoring plans? Were methods used appropriate for meeting targets? Were new protocols used and if so were they effective in meeting targets?

South Slough Reserve: Winchester Tidelands Restoration Project (WTRP)

The Winchester Tidelands is an area within the South Slough Reserve representative of converted and degraded tidal wetlands throughout coastal Oregon and northern California. In 1993, South Slough staff assembled an advisory group of specialists from universities, local and federal agencies, NGO's, and consulting firms with expertise in restoration and estuarine ecology, tidal hydrology, fish biology, program development, project engineering, and permitting to help design a multi-phase project to test the effectiveness of a variety of restoration methods. They have published their results, including research on concepts, methods and lessons learned to increase restoration practitioner's knowledge throughout the Pacific Northwest.
(*www.oregon.gov/DSL/SSNERR/CRMSmain.shtml*)

References

Clewell, Andre; Rieger, John; and Munro, John. (2005) Society for Ecological Restoration International: Guidelines for Developing and Managing Ecological Restoration Projects.

Reserve System Restoration Science Plan and Implementation Strategy (2002) available via Reserve System Intranet under Restoration.

National Marine Fisheries Service (2010) *Guidelines for Incorporating Sea Level Rise into Restoration of Tidal Wetlands in the Northeast* Accessed via Reserve System Intranet under Restoration.

Tools and Resources

Planning for Sea Level Rise in the Northeast: Considerations for the Implementation of Tidal Wetland Habitat Restoration Projects Workshop Report (2011) NOAA's Restoration Center, Northeast Region.

NOAA Habitat Blueprint: a framework to improve habitat for fisheries, marine life, and coastal communities (2012) NOAA Office of Habitat Conservation, National Marine Fisheries Service.

NOAA's Habitat Priority Planner: a GIS tool to help identify and prioritize areas for conservation, restoration, and planning.

SUBCHAPTER B—OCEAN AND COASTAL RESOURCE MANAGEMENT

PART 921—NATIONAL ESTUARINE RESEARCH RESERVE SYSTEM REGULATIONS

Subpart A—General

Subpart B—Site Selection, Post Site Selection and Management Plan Development

Subpart C—Acquisition, Development and Preparation of the Final Management Plan

Subpart D—Reserve Designation and Subsequent Operation

Subpart E—Ongoing Oversight, Performance Evaluation and Withdrawal of Designation

Subpart F—Special Research Projects

Subpart G—Special Monitoring Projects

Subpart H—Special Interpretation and Education Projects

Subpart I—General Financial Assistance Provisions

AUTHORITY: Section 315 of the Coastal Zone Management Act, as amended (16 U.S.C. 1461).

SOURCE: 58 FR 38215, July 15, 1993, unless otherwise noted.

Subpart A—General

§ 921.1 Mission, goals and general provisions.

(a) The mission of the National Estuarine Research Reserve Program is the establishment and management, through Federal-state cooperation, of a national system (National Estuarine Research Reserve System or System) of estuarine research reserves (National Estuarine Research Reserves or Reserves) representative of the various regions and estuarine types in the United States. National Estuarine Research Reserves are established to provide opportunities for long-term research, education, and interpretation.

(b) The goals of the Program are to:

(1) Ensure a stable environment for research through long-term protection of National Estuarine Research Reserve resources;

(2) Address coastal management issues identified as significant through coordinated estuarine research within the System;

(3) Enhance public awareness and understanding of estuarine areas and provide suitable opportunities for public education and interpretation;

(4) Promote Federal, state, public and private use of one or more Reserves within the System when such entities conduct estuarine research; and

(5) Conduct and coordinate estuarine research within the System, gathering and making available information necessary for improved understanding and management of estuarine areas.

(c) National Estuarine Research Reserves shall be open to the public to the extent permitted under state and Federal law. Multiple uses are allowed to the degree compatible with each Reserve's overall purpose as provided in the management plan (see §921.13) and consistent with paragraphs (a) and (b) of this section. Use levels are set by the state where the Reserve is located and analyzed in the management plan. The Reserve management plan shall describe the uses and establish priorities among these uses. The plan shall identify uses requiring a state permit, as well as areas where uses are encouraged or prohibited. Consistent with resource protection and research objectives, public access and use may be restricted to certain areas or components within a Reserve.

(d) Habitat manipulation for research purposes is allowed consistent with the following limitations. Manipulative research activities must be specified in the management plan, be consistent with the mission and goals of the program (see paragraphs (a) and (b) of this section) and the goals and objectives set forth in the Reserve's management plan, and be limited in nature and extent to the minimum manipulative activity necessary to accomplish the stated research objective. Manipulative research activities with a significant or long-term impact on Reserve resources require the prior approval of the state and the National Oceanic and Atmospheric Administration (NOAA). Manipulative research activities which can reasonably be expected to have a significant adverse impact on the estuarine resources and habitat of a Reserve, such that the activities themselves or their resulting short- and long-term consequences compromise the representative character and integrity of a Reserve, are prohibited. Habitat manipulation for resource management purposes is prohibited except as specifically approved by NOAA as: (1) A restoration activity consistent with paragraph (e) of this section; or (2) an activity necessary for the protection of public health or the preservation of other sensitive resources which have been listed or are eligible for protection under relevant Federal or state authority (e.g., threatened/endangered species or significant historical or cultural resources) or if the manipulative activity is a long-term pre-existing use (*i.e.,* has occurred prior to designation) occurring in a buffer area. If habitat manipulation is determined to be necessary for the protection of public health, the preservation of sensitive resources, or if the manipulation is a long-term pre-existing use in a buffer area, then these activities shall be specified in the Reserve management plan in accordance with §921.13(a)(10) and shall be limited to the reasonable alternative which has the least adverse and shortest term impact on the representative and ecological integrity of the Reserve.

(e) Under the Act an area may be designated as an estuarine Reserve only if the area is a representative estuarine ecosystem that is suitable for long-term research. Many estuarine areas have undergone some ecological change as a result of human activities (e.g., hydrological changes, intentional/unintentional species composition changes—introduced and exotic species). In those areas proposed or designated as National Estuarine Research Reserves, such changes may have diminished the representative character and integrity of the site. Although restoration of degraded areas is not a primary purpose of the System, such activities may be permitted to improve the representative character and integrity of a Reserve. Restoration activities must be carefully planned and approved by NOAA through the Reserve management plan. Historical research may be necessary to determine the ''natural'' representative state of an estuarine area (*i.e.,* an estuarine ecosystem minimally affected by

human activity or influence). Frequently, restoration of a degraded estuarine area will provide an excellent opportunity for management oriented research.

(f) NOAA may provide financial assistance to coastal states, not to exceed, per Reserve, 50 percent of all actual costs or $5 million whichever amount is less, to assist in the acquisition of land and waters, or interests therein. NOAA may provide financial assistance to coastal states not to exceed 70 percent of all actual costs for the management and operation of, the development and construction of facilities, and the conduct of educational or interpretive activities concerning Reserves (see subpart I). NOAA may provide financial assistance to any coastal state or public or private person, not to exceed 70 percent of all actual costs, to support research and monitoring within a Reserve. Notwithstanding any financial assistance limits established by this Part, when financial assistance is provided from amounts recovered as a result of damage to natural resources located in the coastal zone, such assistance may be used to pay 100 percent of all actual costs of activities carrier out with this assistance, as long as such funds are available. Predesignation, acquisition and development, operation and management, special research and monitoring, and special education and interpretation awards are available under the National Estuarine Reserve Program. Predesignation awards are for site selection/feasibility, draft management plan preparation and conduct of basic characterization studies. Acquisition and development awards are intended primarily for acquisition of interests in land, facility construction and to develop and/or upgrade research, monitoring and education programs. Operation and management awards provide funds to assist in implementing, operating and managing the administrative, and basic research, monitoring and education programs, outlined in the Reserve management plan. Special research and monitoring awards provide funds to conduct estuarine research and monitoring projects with the System. Special educational and interpretive awards provide funds to conduct estuarine educational and interpretive projects within the System.

(g) Lands already in protected status managed by other Federal agencies, state or local governments, or private organizations may be included within National Estuarine Research Reserves only if the managing entity commits to long-term management consistent with paragraphs (d) and (e) of this section in the Reserve management plan. Federal lands already in protected status may not comprise a majority of the key land and water areas of a Reserve (see § 921.11(c)(3)).

(h) To assist the states in carrying out the Program's goals in an effective manner, NOAA will coordinate a research and education information exchange throughout the National Estuarine Research Reserve System. As part of this role, NOAA will ensure that information and ideas from one Reserve are made available to others in the System. The network will enable Reserves to exchange information and research data with each other, with universities engaged in estuarine research, and with Federal, state, and local agencies. NOAA's objective is a system-wide program of research and monitoring capable of addressing the management issues that affect long-term productivity of our Nation's estuaries.

[58 FR 38215, July 15, 1993, as amended at 62 FR 12540, Mar. 17, 1997; 63 FR 26717, May 14, 1998]

§ 921.2 Definitions.

(a) *Act* means the Coastal Zone Management Act of 1972, as amended, 16 U.S.C. 1451 *et seq*.

(b) *Assistant Administrator* means the Assistant Administrator for Ocean Services and Coastal Zone Management or delegee.

(c) *Coastal state* means a state of the United States, in or bordering on, the Atlantic, Pacific, or Arctic Ocean, the Gulf of Mexico, Long Island Sound, or one or more of the Great Lakes. For the purposes of these regulations the term also includes Puerto Rico, the Virgin Islands, Guam, the Commonwealth of the Northern Marianas Islands, the Trust Territories of the Pacific Islands, and American Samoa (see 16 U.S.C. 1453(4)).

(d) *State agency* means an instrumentality of a coastal state to whom the coastal state has delegated the authority and responsibility for the creation and/or management/operation of a National Estuarine Research Reserve. Factors indicative of this authority may include the power to receive and expend funds on behalf of the Reserve, acquire and sell or convey real and personal property interests, adopt rules for the protection of the Reserve, enforce rules applicable to the Reserve, or develop and implement research and education programs for the reserve. For the purposes of these regulations, the terms ''coastal state'' and ''State agency'' shall be synonymous.

(e) *Estuary* means that part of a river or stream or other body of water having unimpaired connection with the open sea, where the sea water is measurably diluted with fresh water derived from land drainage. The term also includes estuary-type areas with measurable freshwater influence and having unimpaired connections with the open sea, and estuary-type areas of the Great Lakes and their connecting waters (see 16 U.S.C. 1453(7)).

(f) *National Estuarine Research Reserve* means an area that is a representative estuarine ecosystem suitable for long-term research, which may include all of the key land and water portion of an estuary, and adjacent transitional areas and uplands constituting to the extent feasible a natural unit, and which is set aside as a natural field laboratory to provide long-term opportunities for research, education, and interpretation on the ecological relationships within the area (see 16 U.S.C. 1453(8)) and meets the requirements of 16 U.S.C. 1461(b). This includes those areas designated as National Estuarine Sanctuaries or Reserves under section 315 of the Act prior to enactment of the Coastal Zone Act Reauthorization Amendments of 1990 and each area subsequently designated as a National Estuarine Research Reserve.

§ 921.3 National Estuarine Research Reserve System biogeographic classification scheme and estuarine typologies.

(a) National Estuarine Research Reserves are chosen to reflect regional differences and to include a variety of ecosystem types. A biogeographic classification scheme based on regional variations in the nation's coastal zone has been developed. The biogeographic classification scheme is used to ensure that the National Estuarine Research Reserve System includes at least one site from each region. The estuarine typology system is utilized to ensure that sites in the System reflect the wide range of estuarine types within the United States.

(b) The biogeographic classification scheme, presented in appendix I, contains 29 regions. Figure 1 graphically depicts the biogeographic regions of the United States.

(c) The typology system is presented in appendix II.

§ 921.4 Relationship to other provisions of the Coastal Zone Management Act, and to the Marine Protection, Research and Sanctuaries Act.

(a) The National Estuarine Research Reserve System is intended to provide information to state agencies and other entities involved in addressing coastal management issues. Any coastal state, including those that do not have approved coastal management programs under section 306 of the Act, is eligible for an award under the National Estuarine Research Reserve Program (see § 921.2(c)).

(b) For purposes of consistency review by states with a federally approved coastal management program, the designation of a National Estuarine Research Reserve is deemed to be a Federal activity, which, if directly affecting the state's coastal zone, must be undertaken in a manner consistent to the maximum extent practicable with the approved state coastal management program as provided by section 1456(c)(1) of the Act, and implementing regulations at 15 CFR part 930, subpart C. In accordance with section 1456(c)(1) of the Act and the applicable regulations NOAA will be responsible for certifying that designation of the Reserve is consistent with the state's approved coastal management program. The state must concur with or object to the certification. It is recommended that the lead state agency for Reserve designation consult, at the

earliest practicable time, with the appropriate state officials concerning the consistency of a proposed National Estuarine Research Reserve.

(c) The National Estuarine Research Reserve Program will be administered in close coordination with the National Marine Sanctuary Program (Title III of the Marine Protection, Research and Sanctuaries Act, as amended, 16 U.S.C. 1431–1445), also administered by NOAA. Title III authorizes the Secretary of Commerce to designate discrete areas of the marine environment as National Marine Sanctuaries to protect or restore such areas for their conservation, recreational, ecological, historical, research, educational or esthetic values. National Marine Sanctuaries and Estuarine Research Reserves may not overlap, but may be adjacent.

Subpart B—Site Selection, Post Site Selection and Management Plan Development

§ 921.10 General.

(a) A coastal state may apply for Federal financial assistance for the purpose of site selection, preparation of documents specified in § 921.13 (draft management plan (DMP) and environmental impact statement (EIS)), and the conduct of limited basic characterization studies. The total Federal share of this assistance may not exceed $100,000. Federal financial assistance for preacquisition activities under § 921.11 and § 921.12 is subject to the total $5 million for which each Reserve is eligible for land acquisition. Notwithstanding the above, when financial assistance is provided from amounts recovered as a result of damage to natural resources located in the coastal zone, such assistance may be used to pay 100 percent of all actual costs of activities carried out with this assistance, as long as such funds are available. In the case of a biogeographic region (see appendix I) shared by two or more coastal states, each state is eligible for Federal financial assistance to establish a separate National Estuarine Research Reserve within their respective portion of the shared biogeographic region. Each separate National Estuarine Research Reserve is eligible for the full complement of funding. Financial assistance application procedures are specified in subpart I.

(b) In developing a Reserve program, a state may choose to develop a multiple-site Reserve reflecting a diversity of habitats in a single biogeographic region. A multiple-site Reserve allows the state to develop complementary research and educational programs within the individual components of its multi-site Reserve. Multiple-site Reserves are treated as one Reserve in terms of financial assistance and development of an overall management framework and plan. Each individual site of a proposed multiple-site Reserve shall be evaluated both separately under § 921.11(c) and collectively as part of the site selection process. A coastal state may propose to establish a multiple-site Reserve at the time of the initial site selection, or at any point in the development or operation of the Reserve. If the state decides to develop a multiple-site National Estuarine Research Reserve after the initial acquisition and development award is made for a single site, the proposal is subject to the requirements set forth in § 921.33(b). However, a state may not propose to add one or more sites to an already designated Reserve if the operation and management of such Reserve has been found deficient and uncorrected or the research conducted is not consistent with the Estuarine Research Guidelines referenced in § 921.51. In addition, Federal funds for the acquisition of a multiple-site Reserve remain limited to $5,000,000 (see § 921.20). The funding for operation of a multiple-site Reserve is limited to the maximum allowed for any one Reserve per year (see § 921.32(c)) and preacquisition funds are limited to $100,000 per Reserve. Notwithstanding the above, when financial assistance is provided from amounts recovered as a result of damage to natural resources located in the coastal zone, such assistance may be used to pay 100 percent of all actual costs of activities carrier out with this assistance, as long as such funds are available.

[58 FR 38215, July 15, 1993, as amended at 63 FR 26717, May 14, 1998]

§ 921.11 Site selection and feasibility.

(a) A coastal state may use Federal funds to establish and implement a site selection process which is approved by NOAA.

(b) In addition to the requirements set forth in subpart I, a request for Federal funds for site selection must contain the following programmatic information:

(1) A description of the proposed site selection process and how it will be implemented in conformance with the biogeographic classification scheme and typology (§ 921.3);

(2) An identification of the site selection agency and the potential management agency; and

(3) A description of how public participation will be incorporated into the process (see § 921.11(d)).

(c) As part of the site selection process, the state and NOAA shall evaluate and select the final site(s). NOAA has final authority in approving such sites. Site selection shall be guided by the following principles:

(1) The site's contribution to the biogeographical and typological balance of the National Estuarine Research Reserve System. NOAA will give priority consideration to proposals to establish Reserves in biogeographic regions or subregions or incorporating types that are not represented in the system. (see the biogeographic classification scheme and typology set forth in § 921.3 and appendices I and II);

(2) The site's ecological characteristics, including its biological productivity, diversity of flora and fauna, and capacity to attract a broad range of research and educational interests. The proposed site must be a representative estuarine ecosystem and should, to the maximum extent possible, be an estuarine ecosystem minimally affected by human activity or influence (see § 921.1(e)).

(3) Assurance that the site's boundaries encompass an adequate portion of the key land and water areas of the natural system to approximate an ecological unit and to ensure effective conservation. Boundary size will vary greatly depending on the nature of the ecosystem. Reserve boundaries must encompass the area within which adequate control has or will be established by the managing entity over human activities occurring within the Reserve. Generally, Reserve boundaries will encompass two areas: Key land and water areas (or ''core area'') and a buffer zone. Key land and water areas and a buffer zone will likely require significantly different levels of control (see § 921.13(a)(7)). The term ''key land and water areas'' refers to that core area within the Reserve that is so vital to the functioning of the estuarine ecosystem that it must be under a level of control sufficient to ensure the long-term viability of the Reserve for research on natural processes. Key land and water areas, which comprise the core area, are those ecological units of a natural estuarine system which preserve, for research purposes, a full range of significant physical, chemical and biological factors contributing to the diversity of fauna, flora and natural processes occurring within the estuary. The determination of which land and water areas are ''key'' to a particular Reserve must be based on specific scientific knowledge of the area. A basic principle to follow when deciding upon key land and water areas is that they should encompass resources representative of the total ecosystem, and which if compromised could endanger the research objectives of the Reserve. The term *buffer zone* refers to an area adjacent to or surrounding key land and water areas and essential to their integrity. Buffer zones protect the core area and provide additional protection for estuarine-dependent species, including those that are rare or endangered. When determined appropriate by the state and approved by NOAA, the buffer zone may also include an area necessary for facilities required for research and interpretation. Additionally, buffer zones should be established sufficient to accommodate a shift of the core area as a result of biological, ecological or geomorphological change which reasonably could be expected to occur. National Estuarine Research Reserves may include existing Federal or state lands already in a protected status where mutual benefit can be enhanced. However, NOAA will not approve a site

for potential National Estuarine Research Reserve status that is dependent primarily upon the inclusion of currently protected Federal lands in order to meet the requirements for Reserve status (such as key land and water areas). Such lands generally will be included within a Reserve to serve as a buffer or for other ancillary purposes; and may be included, subject to NOAA approval, as a limited portion of the core area;

(4) The site's suitability for long-term estuarine research, including ecological factors and proximity to existing research facilities and educational institutions;

(5) The site's compatibility with existing and potential land and water uses in contiguous areas as well as approved coastal and estuarine management plans; and

(6) The site's importance to education and interpretive efforts, consistent with the need for continued protection of the natural system.

(d) Early in the site selection process the state must seek the views of affected landowners, local governments, other state and Federal agencies and other parties who are interested in the area(s) being considered for selection as a potential National Estuarine Research Reserve. After the local government(s) and affected landowner(s) have been contacted, at least one public meeting shall be held in the vicinity of the proposed site. Notice of such a meeting, including the time, place, and relevant subject matter, shall be announced by the state through the area's principal newspaper at least 15 days prior to the date of the meeting and by NOAA in the FEDERAL REGISTER.

(e) A state request for NOAA approval of a proposed site (or sites in the case of a multi-site Reserve) must contain a description of the proposed site(s) in relationship to each of the site selection principals (§ 921.11(c)) and the following information:

(1) An analysis of the proposed site(s) based on the biogeographical scheme/typology discussed in § 921.3 and set forth in appendices I and II;

(2) A description of the proposed site(s) and its (their) major resources, including location, proposed boundaries, and adjacent land uses. Maps are required;

(3) A description of the public participation process used by the state to solicit the views of interested parties, a summary of comments, and, if interstate issues are involved, documentation that the Governor(s) of the other affected state(s) has been contacted. Copies of all correspondence, including contact letters to all affected landowners must be appended;

(4) A list of all sites considered and a brief statement of the reasons why a site was not preferred; and

(5) A nomination of the proposed site(s) for designation as a National Estuarine Research Reserve by the Governor of the coastal state in which the state is located.

(f) A state proposing to reactivate an inactive site, previously approved by NOAA for development as an Estuarine Sanctuary or Reserve, may apply for those funds remaining, if any, provided for site selection and feasibility (§ 921.11a)) to determine the feasibility of reactivation. This feasibility study must comply with the requirements set forth in § 921.11 (c) through (e).

§ 921.12 Post site selection.

(a) At the time of the coastal state's request for NOAA approval of a proposed site, the state may submit a request for funds to develop the draft management plan and for preparation of the EIS. At this time, the state may also submit a request for the remainder of the predesignation funds to perform a limited basic characterization of the physical, chemical and biological characteristics of the site approved by NOAA necessary for providing EIS information to NOAA. The state's request for these post site selection funds must be accompanied by the information specified in subpart I and, for draft management plan development and EIS information collection, the following programmatic information:

(1) A draft management plan outline (see § 921.13(a) below); and

(2) An outline of a draft memorandum of understanding (MOU) between the state and NOAA detailing the Federal-state role in Reserve management during the initial period of Federal funding and expressing the

state's long-term commitment to operate and manage the Reserve.

(b) The state is eligible to use the funds referenced in § 921.12(a) after the proposed site is approved by NOAA under the terms of § 921.11.

§ 921.13 Management plan and environmental impact statement development.

(a) After NOAA approves the state's proposed site and application for funds submitted pursuant to § 921.12, the state may begin draft management plan development and the collection of information necessary for the preparation by NOAA of an EIS. The state shall develop a draft management plan, including an MOU. The plan shall set out in detail:

(1) Reserve goals and objectives, management issues, and strategies or actions for meeting the goals and objectives;

(2) An administrative plan including staff roles in administration, research, education/interpretation, and surveillance and enforcement;

(3) A research plan, including a monitoring design;

(4) An education/interpretive plan;

(5) A plan for public access to the Reserve;

(6) A construction plan, including a proposed construction schedule, general descriptions of proposed developments and general cost estimates. Information should be provided for proposed minor construction projects in sufficient detail to allow these projects to begin in the initial phase of acquisition and development. A categorical exclusion, environmental assessment, or EIS may be required prior to construction;

(7)(i) An acquisition plan identifying the ecologically key land and water areas of the Reserve, ranking these areas according to their relative importance, and including a strategy for establishing adequate long-term state control over these areas sufficient to provide protection for Reserve resources to ensure a stable environment for research. This plan must include an identification of ownership within the proposed Reserve boundaries, including land already in the public domain; the method(s) of acquisition which the state proposes to use—acquisition (including less-than-fee simple options) to establish adequate long-term state control; an estimate of the fair market value of any property interest—which is proposed for acquisition; a schedule estimating the time required to complete the process of establishing adequate state control of the proposed research reserve; and a discussion of any anticipated problems. In selecting a preferred method(s) for establishing adequate state control over areas within the proposed boundaries of the Reserve, the state shall perform the following steps for each parcel determined to be part of the key land and water areas (control over which is necessary to protect the integrity of the Reserve for research purposes), and for those parcels required for research and interpretive support facilities or buffer purposes:

(A) Determine, with appropriate justification, the minimum level of control(s) required [e.g., management agreement, regulation, less-than-fee simple property interest (e.g., conservation easement), fee simple property acquisition, or a combination of these approaches]. This does not preclude the future necessity of increasing the level of state control;

(B) Identify the level of existing state control(s);

(C) Identify the level of additional state control(s), if any, necessary to meet the minimum requirements identified in paragraph (a)(7)(i)(A) of this section;

(D) Examine all reasonable alternatives for attaining the level of control identified in paragraph (a)(7)(i)(C) of this section, and perform a cost analysis of each; and

(E) Rank, in order of cost, the methods (including acquisition) identified in paragraph (a)(7)(i)(D) of this section.

(ii) An assessment of the relative cost-effectiveness of control alternatives shall include a reasonable estimate of both short-term costs (e.g., acquisition of property interests, regulatory program development including associated enforcement costs, negotiation, adjudication, etc.) and long-term costs (e.g., monitoring, enforcement,

adjudication, management and coordination). In selecting a preferred method(s) for establishing adequate state control over each parcel examined under the process described above, the state shall give priority consideration to the least costly method(s) of attaining the minimum level of long-term control required. Generally, with the possible exception of buffer areas required for support facilities, the level of control(s) required for buffer areas will be considerably less than that required for key land and water areas. This acquisition plan, after receiving the approval of NOAA, shall serve as a guide for negotiations with landowners. A final boundary for the reserve shall be delineated as a part of the final management plan;

(8) A resource protection plan detailing applicable authorities, including allowable uses, uses requiring a permit and permit requirements, any restrictions on use of the research reserve, and a strategy for research reserve surveillance and enforcement of such use restrictions, including appropriate government enforcement agencies;

(9) If applicable, a restoration plan describing those portions of the site that may require habitat modification to restore natural conditions;

(10) If applicable, a resource manipulation plan, describing those portions of the Reserve buffer in which long-term pre-existing (prior to designation) manipulation for reasons not related to research or restoration is occurring. The plan shall explain in detail the nature of such activities, shall justify why such manipulation should be permitted to continue within the reserve buffer; and shall describe possible effects of this manipulation on key land and water areas and their resources;

(11) A proposed memorandum of understanding (MOU) between the state and NOAA regarding the Federal-state relationship during the establishment and development of the National Estuarine Research Reserve, and expressing a long-term commitment by the state to maintain and manage the Reserve in accordance with section 315 of the Act, 16 U.S.C. 1461, and applicable regulations. In conjunction with the MOU, and where possible under state law, the state will consider taking appropriate administrative or legislative action to ensure the long-term protection and operation of the National Estuarine Research Reserve. If other MOUs are necessary (such as with a Federal agency, another state agency or private organization), drafts of such MOUs must be included in the plan. All necessary MOU's shall be signed prior to Reserve designation; and

(12) If the state has a federally approved coastal management program, a certification that the National Estuarine Research Reserve is consistent to the maximum extent practicable with that program. See §§ 921.4(b) and 921.30(b).

(b) Regarding the preparation of an EIS under the National Environmental Policy Act on a National Estuarine Research Reserve proposal, the state and NOAA shall collect all necessary information concerning the socioeconomic and environmental impacts associated with implementing the draft management plan and feasible alternatives to the plan. Based on this information, the state will draft and provide NOAA with a preliminary EIS.

(c) Early in the development of the draft management plan and the draft EIS, the state and NOAA shall hold a scoping meeting (pursuant to NEPA) in the area or areas most affected to solicit public and government comments on the significant issues related to the proposed action. NOAA will publish a notice of the meeting in the FEDERAL REGISTER at least 15 days prior to the meeting. The state shall be responsible for publishing a similar notice in the local media.

(d) NOAA will publish a FEDERAL REGISTER notice of intent to prepare a draft EIS. After the draft EIS is prepared and filed with the Environmental Protection Agency (EPA), a Notice of Availability of the draft EIS will appear in the FEDERAL REGISTER. Not less than 30 days after publication of the notice, NOAA will hold at least one public hearing in the area or areas most affected by the proposed national estuarine research reserve. The hearing will be held no sooner than 15 days after appropriate notice of the meeting has been given in the principal news media by the state and in the FEDERAL REGISTER by NOAA. After a 45-day

comment period, a final EIS will be prepared by the state and NOAA.

Subpart C—Acquisition, Development and Preparation of the Final Management Plan

§ 921.20 General.

The acquisition and development period is separated into two major phases. After NOAA approval of the site, draft management plan and draft MOU, and completion of the final EIS, a coastal state is eligible for an initial acquisition and development award(s). In this initial phase, the state should work to meet the criteria required for formal research reserve designation; e.g., establishing adequate state control over the key land and water areas as specified in the draft management plan and preparing the final management plan. These requirements are specified in § 921.30. Minor construction in accordance with the draft management plan may also be conducted during this initial phase. The initial acquisition and development phase is expected to last no longer than three years. If necessary, a longer time period may be negotiated between the state and NOAA. After Reserve designation, a state is eligible for a supplemental acquisition and development award(s) in accordance with § 921.31. In this post-designation acquisition and development phase, funds may be used in accordance with the final management plan to construct research and educational facilities, complete any remaining land acquisition, for program development, and for restorative activities identified in the final management plan. In any case, the amount of Federal financial assistance provided to a coastal state with respect to the acquisition of lands and waters, or interests therein, for any one National Estuarine Research Reserve may not exceed an amount equal to 50 percent of the costs of the lands, waters, and interests therein or $5,000,000, whichever amount is less, except when the financial assistance is provided from amounts recovered as a result of damage to natural resources located in the coastal zone, in which case the assistance may be used to pay 100 percent of all actual costs of activities carrier out with this assistance, as long as such funds are available.

[58 FR 38215, July 15, 1993, as amended at 62 FR 12540, Mar. 17, 1997; 63 FR 26717, May 14, 1998]

§ 921.21 Initial acquisition and development awards.

(a) Assistance is provided to aid the recipient prior to designation in:

(1) Acquiring a fee simple or less-than-fee simple real property interest in land and water areas to be included in the Reserve boundaries (see § 921.13(a)(7); § 921.30(d));

(2) Minor construction, as provided in paragraphs (b) and (c) of this section;

(3) Preparing the final management plan; and

(4) Initial management costs, e.g., for implementing the NOAA approved draft management plan, hiring a Reserve manager and other staff as necessary and for other management-related activities. Application procedures are specified in subpart I.

(b) The expenditure of Federal and state funds on major construction activities is not allowed during the initial acquisition and development phase. The preparation of architectural and engineering plans, including specifications, for any proposed construction, or for proposed restorative activities, is permitted. In addition, minor construction activities, consistent with paragraph (c) of this section also are allowed. The NOAA-approved draft management plan must, however, include a construction plan and a public access plan before any award funds can be spent on construction activities.

(c) Only minor construction activities that aid in implementing portions of the management plan (such as boat ramps and nature trails) are permitted during the initial acquisition and development phase. No more than five (5) percent of the initial acquisition and development award may be expended on such activities. NOAA must make a specific determination, based on the final EIS, that the construction activity will not be detrimental to the environment.

(d) Except as specifically provided in paragraphs (a) through (c) of this section, construction projects, to be funded in whole or in part under an acquisition and development award(s), may not be initiated until the Reserve receives formal designation (see § 921.30). This requirement has been adopted to ensure that substantial progress in establishing adequate state control over key land and water areas has been made and that a final management plan is completed before major sums are spent on construction. Once substantial progress in establishing adequate state control/acquisition has been made, as defined by the state in the management plan, other activities guided by the final management plan may begin with NOAA's approval.

(e) For any real property acquired in whole or part with Federal funds for the Reserve, the state shall execute suitable title documents to include substantially the following provisions, or otherwise append the following provisions in a manner acceptable under applicable state law to the official land record(s):

(1) Title to the property conveyed by this deed shall vest in the [recipient of the award granted pursuant to section 315 of the Act, 16 U.S.C. 1461 or other NOAA approved state agency] subject to the condition that the designation of the [name of National Estuarine Reserve] is not withdrawn and the property remains part of the federally designated [name of National Estuarine Research Reserve]; and

(2) In the event that the property is no longer included as part of the Reserve, or if the designation of the Reserve of which it is part is withdrawn, then NOAA or its successor agency, after full and reasonable consultation with the State, may exercise the following rights regarding the disposition of the property:

(i) The recipient may retain title after paying the Federal Government an amount computed by applying the Federal percentage of participation in the cost of the original project to the current fair market value of the property;

(ii) If the recipient does not elect to retain title, the Federal Government may either direct the recipient to sell the property and pay the Federal Government an amount computed by applying the Federal percentage of participation in the cost of the original project to the proceeds from the sale (after deducting actual and reasonable selling and repair or renovation expenses, if any, from the sale proceeds), or direct the recipient to transfer title to the Federal Government. If directed to transfer title to the Federal Government, the recipient shall be entitled to compensation computed by applying the recipient's percentage of participation in the cost of the original project to the current fair market value of the property; and

(iii) Fair market value of the property must be determined by an independent appraiser and certified by a responsible official of the state, as provided by Department of Commerce regulations at 15 CFR part 24, and Uniform Relocation Assistance and Real Property Acquisition for Federal and Federally assisted programs at 15 CFR part 11.

(f) Upon instruction by NOAA, provisions analogous to those of § 921.21(e) shall be included in the documentation underlying less-then-fee-simple interests acquired in whole or part with Federal funds.

(g) Federal funds or non-Federal matching share funds shall not be spent to acquire a real property interest in which the state will own the land concurrently with another entity unless the property interest has been identified as a part of an acquisition strategy pursuant to § 921.13(7) which has been approved by NOAA prior to the effective date of these regulations.

(h) Prior to submitting the final management plan to NOAA for review and approval, the state shall hold a public meeting to receive comment on the plan in the area affected by the estuarine research reserve. NOAA will publish a notice of the meeting in the FEDERAL REGISTER at least 15 days prior to the public meeting. The state shall be responsible for having a similar notice published in the local newspaper(s).

Subpart D—Reserve Designation and Subsequent Operation

§ 921.30 Designation of National Estuarine Research Reserves.

(a) The Under Secretary may designate an area proposed for designation by the Governor of the state in which it is located, as a National Esturaine Research Reserve if the Under Secretary finds:

(1) The area is a representative estuarine ecosystem that is suitable for long-term research and contributes to the biogeographical and typological balance of the System;

(2) Key land and water areas of the proposed Reserve, as identified in the management plan, are under adequate state control sufficient to provide long-term protection for reserve resources to ensure a stable environment for research;

(3) Designation of the area as a Reserve will serve to enhance public awareness and understanding of estuarine areas, and provide suitable opportunities for public education and interpretation;

(4) A final management plan has been approved by NOAA;

(5) An MOU has been signed between the state and NOAA ensuring a long-term commitment by the state to the effective operation and implementation of the area as a National Estuarine Research Reserve;

(6) All MOU's necessary for reserve management (*i.e.*, with relevant Federal, state, and local agencies and/or private organizations) have been signed; and

(7) The coastal state in which the area is located has complied with the requirements of subpart B.

(b) NOAA will determine whether the designation of a National Estuarine Research Reserve in a state with a federally approved coastal zone management program directly affects the coastal zone. If the designation is found to directly affect the coastal zone, NOAA will make a consistency determination pursuant to §307(c)(1) of the Act, 16 U.S.C. 1456, and 15 CFR part 930, subpart C. See §921.4(b). The results of this consistency determination will be published in the FEDERAL REGISTER when the notice of designation is published. See §921.30(c).

(c) NOAA will publish the notice of designation of a National Estuarine Research Reserve in the FEDERAL REGISTER. The state shall be responsible for having a similar notice published in the local media.

(d) The term *state control* in §921.30(a)(3) does not necessarily require that key land and water areas be owned by the state in fee simple. Acquisition of less-than-fee simple interests e.g., conservation easements) and utilization of existing state regulatory measures are encouraged where the state can demonstrate that these interests and measures assure adequate long-term state control consistent with the purposes of the research reserve (see also §§921.13(a)(7); 921.21(g)). Should the state later elect to purchase an interest in such lands using NOAA funds, adequate justification as to the need for such acquisition must be provided to NOAA.

§ 921.31 Supplemental acquisition and development awards.

After National Estuarine Research Reserve designation, and as specified in the approved management plan, a coastal state may request a supplemental acquisition and/or development award(s) for acquiring additional property interests identified in the management plan as necessary to strengthen protection of key land and water areas and to enhance long-term protection of the area for research and education, for facility and exhibit construction, for restorative activities identified in the approved management plan, for administrative purposes related to acquisition and/or facility construction and to develop and/or upgrade research, monitoring and education/interpretive programs. Federal financial assistance provided to a National Estuarine Research Reserve for supplemental development costs directly associated with facility construction (*i.e.*, major construction activities) may not exceed 70 percent of the total project cost, except when the financial assistance is provided from amounts recovered as a result of damage to natural resources located in the coastal zone, in which case the assistance may be used to pay 100

percent of the costs. NOAA must make a specific determination that the construction activity will not be detrimental to the environment. Acquisition awards for the acquisition of lands or waters, or interests therein, for any one reserve may not exceed an amount equal to 50 percent of the costs of the lands, waters, and interests therein of $5,000,000, whichever amount is less, except when the financial assistance is provided from amounts recovered as result of damage to natural resources located in the coastal zone, in which case the assistance may be used to pay 100 percent of all actual costs of activities carrier out with this assistance, as long as such funds are available. In the case of a biogeographic region (see appendix I) shared by two or more states, each state is eligible independently for Federal financial assistance to establish a separate National Estuarine Research Reserve within their respective portion of the shared biogeographic region. Application procedures are specified in subpart I. Land acquisition must follow the procedures specified in §§ 921.13(a)(7), 921.21(e) and (f) and 921.81.

[58 FR 38215, July 15, 1993, as amended at 62 FR 12540, Mar. 17, 1997; 63 FR 26717, May 14, 1998]

§ 921.32 Operation and management: Implementation of the management plan.

(a) After the Reserve is formally designated, a coastal state is eligible to receive Federal funds to assist the state in the operation and management of the Reserve including the management of research, monitoring, education, and interpretive programs. The purpose of this Federally funded operation and management phase is to implement the approved final management plan and to take the necessary steps to ensure the continued effective operation of the Reserve.

(b) State operation and management of the Reserves shall be consistent with the mission, and shall further the goals of the National Estuarine Research Reserve program (see § 921.1).

(c) Federal funds are available for the operation and management of the Reserve. Federal funds provided pursuant to this section may not exceed 70 percent of the total cost of operating and managing the Reserve for any one year, except when the financial assistance is provided from amounts recovered as a result of damage to natural resources located in the coastal zone, in which case the assistance may be used to pay 100 percent of the costs. In the case of a biogeographic region (see Appendix I) shared by two or more states, each state is eligible for Federal financial assistance to establish a separate Reserve within their respective portion of the shared biogeographic region (see § 921.10).

(d) Operation and management funds are subject to the following limitations:

(1) Eligible coastal state agencies may apply for up to the maximum share available per Reserve for that fiscal year. Share amounts will be announced annually by letter from the Sanctuary and Reserves Division to all participating states. This letter will be provided as soon as practicable following approval of the Federal budget for that fiscal year.

(2) No more than ten percent of the total amount (state and Federal shares) of each operation and management award may be used for construction-type activities.

[58 FR 38215, July 15, 1993, as amended at 62 FR 12541, Mar. 17, 1997]

§ 921.33 Boundary changes, amendments to the management plan, and addition of multiple-site components.

(a) Changes in the boundary of a Reserve and major changes to the final management plan, including state laws or regulations promulgated specifically for the Reserve, may be made only after written approval by NOAA. NOAA may require public notice, including notice in the FEDERAL REGISTER and an opportunity for public comment before approving a boundary or management plan change. Changes in the boundary of a Reserve involving the acquisition of properties not listed in the management plan or final EIS require public notice and the opportunity for comment; in certain cases, a categorical exclusion, an environmental assessment and possibly an environmental impact statement may be required.

NOAA will place a notice in the FEDERAL REGISTER of any proposed changes in Reserve boundaries or proposed major changes to the final management plan. The state shall be responsible for publishing an equivalent notice in the local media. See also requirements of §§ 921.4(b) and 921.13(a)(11).

(b) As discussed in § 921.10(b), a state may choose to develop a multiple-site National Estuarine Research Reserve after the initial acquisition and development award for a single site has been made. NOAA will publish notice of the proposed new site including an invitation for comments from the public in the FEDERAL REGISTER. The state shall be responsible for publishing an equivalent notice in the local newspaper(s). An EIS, if required, shall be prepared in accordance with section § 921.13 and shall include an administrative framework for the multiple-site Reserve and a description of the complementary research and educational programs within the Reserve. If NOAA determines, based on the scope of the project and the issues associated with the additional site(s), that an environmental assessment is sufficient to establish a multiple-site Reserve, then the state shall develop a revised management plan which, concerning the additional component, incorporates each of the elements described in § 921.13(a). The revised management plan shall address goals and objectives for all components of the multi-site Reserve and the additional component's relationship to the original site(s).

(c) The state shall revise the management plan for a Reserve at least every five years, or more often if necessary. Management plan revisions are subject to (a) above.

(d) NOAA will approve boundary changes, amendments to management plans, or the addition of multiple-site components, by notice in the FEDERAL REGISTER. If necessary NOAA will revise the designation document (findings) for the site.

Subpart E—Ongoing Oversight, Performance Evaluation and Withdrawal of Designation

§ 921.40 Ongoing oversight and evaluations of designated National Estuarine Research Reserves.

(a) The Sanctuaries and Reserve Division shall conduct, in accordance with section 312 of the Act and procedures set forth in 15 CFR part 928, ongoing oversight and evaluations of Reserves. Interim sanctions may be imposed in accordance with regulations promulgated under 15 CFR part 928.

(b) The Assistant Administrator may consider the following indicators of non-adherence in determining whether to invoke interim sanctions:

(1) Inadequate implementation of required staff roles in administration, research, education/interpretation, and surveillance and enforcement. Indicators of inadequate implementation could include: No Reserve Manager, or no staff or insufficient staff to carry out the required functions.

(2) Inadequate implementation of the required research plan, including the monitoring design. Indicators of inadequate implementation could include: Not carrying out research or monitoring that is required by the plan, or carrying out research or monitoring that is inconsistent with the plan.

(3) Inadequate implementation of the required education/interpretation plan. Indicators of inadequate implementation could include: Not carrying out education or interpretation that is required by the plan, or carrying out education/interpretation that is inconsistent with the plan.

(4) Inadequate implementation of public access to the Reserve. Indicators of inadequate implementation of public access could include: Not providing necessary access, giving full consideration to the need to keep some areas off limits to the public in order to protect fragile resources.

(5) Inadequate implementation of facility development plan. Indicators of inadequate implementation could include: Not taking action to propose and budget for necessary facilities, or not undertaking necessary construction in a timely manner when funds are available.

(6) Inadequate implementation of acquisition plan. Indicators of inadequate implementation could include: Not pursuing an aggressive acquisition program with all available funds for that purpose, not requesting promptly additional funds when necessary, and evidence that adequate long-term state control has not been established over some core or buffer areas, thus jeopardizing the ability to protect the Reserve site and resources from offsite impacts.

(7) Inadequate implementation of Reserve protection plan. Indicators of inadequate implementation could include: Evidence of non-compliance with Reserve restrictions, insufficient surveillance and enforcement to assure that restrictions on use of the Reserve are adhered to, or evidence that Reserve resources are being damaged or destroyed as a result of the above.

(8) Failure to carry out the terms of the signed Memorandum of Understanding (MOU) between the state and NOAA, which establishes a long-term state commitment to maintain and manage the Reserve in accordance with section 315 of the Act. Indicators of failure could include: State action to allow incompatible uses of state-controlled lands or waters in the Reserve, failure of the state to bear its fair share of costs associated with long-term operation and management of the Reserve, or failure to initiate timely updates of the MOU when necessary.

§ 921.41 Withdrawal of designation.

The Assistant Administrator may withdraw designation of an estuarine area as a National Estuarine Research Reserve pursuant to and in accordance with the procedures of section 312 and 315 of the Act and regulations promulgated thereunder.

Subpart F—Special Research Projects

§ 921.50 General.

(a) To stimulate high quality research within designated National Estuarine Research Reserves, NOAA may provide financial support for research projects which are consistent with the Estuarine Research Guidelines referenced in § 921.51. Research awards may be awarded under this subpart to only those designated Reserves with approved final management plans. Although research may be conducted within the immediate watershed of the Reserve, the majority of research activities of any single research project funded under this subpart may be conducted within Reserve boundaries. Funds provided under this subpart are primarily used to support management-related research projects that will enhance scientific understanding of the Reserve ecosystem, provide information needed by Reserve management and coastal management decision-makers, and improve public awareness and understanding of estuarine ecosystems and estuarine management issues. Special research projects may be oriented to specific Reserves; however, research projects that would benefit more than one Reserve in the National Estuarine Reserve Research System are encouraged.

(b) Funds provided under this subpart are available on a competitive basis to any coastal state or qualified public or private person. A notice of available funds will be published in the FEDERAL REGISTER. Special research project funds are provided in addition to any other funds available to a coastal state under the Act. Federal funds provided under this subpart may not exceed 70 percent of the total cost of the project, consistent with § 921.81(e)(4) (''allowable costs''), except when the financial assistance is provided from amounts recovered as a result of damage to natural resources located in the coastal zone, in which case the assistance may be used to pay 100 percent of the costs.

[58 FR 38215, July 15, 1993, as amended at 62 FR 12541, Mar. 17, 1997]

§ 921.51 Estuarine research guidelines.

(a) Research within the National Estuarine Research Reserve System shall be conducted in a manner consistent with Estuarine Research Guidelines developed by NOAA.

(b) A summary of the Estuarine Research Guidelines is published in the FEDERAL REGISTER as a part of the notice of available funds discussed in § 921.50(c).

(c) The Estuarine Research Guidelines are reviewed annually by NOAA. This review will include an opportunity

for comment by the estuarine research community.

§ 921.52 Promotion and coordination of estuarine research.

(a) NOAA will promote and coordinate the use of the National Estuarine Research Reserve System for research purposes.

(b) NOAA will, in conducting or supporting estuarine research other than that authorized under section 315 of the Act, give priority consideration to research that make use of the National Estuarine Research Reserve System.

(c) NOAA will consult with other Federal and state agencies to promote use of one or more research reserves within the National Estuarine Research Reserve System when such agencies conduct estuarine research.

Subpart G—Special Monitoring Projects

§ 921.60 General.

(a) To provide a systematic basis for developing a high quality estuarine resource and ecosystem information base for National Estuarine Research Reserves and, as a result, for the System, NOAA may provide financial support for basic monitoring programs as part of operations and management under § 921.32. Monitoring funds are used to support three major phases of a monitoring program:

(1) Studies necessary to collect data for a comprehensive site description/characterization;

(2) Development of a site profile; and

(3) Formulation and implementation of a monitoring program.

(b) Additional monitoring funds may be available on a competitive basis to the state agency responsible for Reserve management or a qualified public or private person or entity. However, if the applicant is other than the managing entity of a Reserve that applicant must submit as a part of the application a letter from the Reserve manager indicating formal support of the application by the managing entity of the Reserve. Funds provided under this subpart for special monitoring projects are provided in addition to any other funds available to a coastal state under the Act. Federal funds provided under this subpart may not exceed 70 percent of the total cost of the project, consistent with § 921.81(e)(4) (''allowable costs''), except when the financial assistance is provided from amounts recovered as a result of damage to natural resources located in the coastal zone, in which case the assistance may be used to pay 100 percent of the costs.

(c) Monitoring projects funded under this subpart must focus on the resources within the boundaries of the Reserve and must be consistent with the applicable sections of the Estuarine Research Guidelines referenced in § 921.51. Portions of the project may occur within the immediate watershed of the Reserve beyond the site boundaries. However, the monitoring proposal must demonstrate why this is necessary for the success of the project.

[58 FR 38215, July 15, 1993, as amended at 62 FR 12541, Mar. 17, 1997]

Subpart H—Special Interpretation and Education Projects

§ 921.70 General.

(a) To stimulate the development of innovative or creative interpretive and educational projects and materials to enhance public awareness and understanding of estuarine areas, NOAA may fund special interpretive and educational projects in addition to those activities provided for in operations and management under § 921.32. Special interpretive and educational awards may be awarded under this subpart to only those designated Reserves with approved final management plans.

(b) Funds provided under this subpart may be available on a competitive basis to any state agency. However, if the applicant is other than the managing entity of a Reserve, that applicant must submit as a part of the application a letter from the Reserve manager indicating formal support of the application by the managing entity of the Reserve. These funds are provided in addition to any other funds available to a coastal state under the Act. Federal funds provided under this subpart may not exceed 70 percent of the total cost of the project, consistent with § 921.81(e)(4) (''allowable costs''),

except when the financial assistance is provided from amounts recovered as a result of damage to natural resources located in the coastal zone, in which case the assistance may be used to pay 100 percent of the costs.

(c) Applicants for education/interpretive projects that NOAA determines benefit the entire National Estuarine Research Reserve System may receive Federal assistance of up to 100% of project costs.

[58 FR 38215, July 15, 1993, as amended at 62 FR 12541, Mar. 17, 1997]

Subpart I—General Financial Assistance Provisions

§ 921.80 Application information.

(a) Only a coastal state may apply for Federal financial assistance awards for preacquisition, acquisition and development, operation and management, and special education and interpretation projects under subpart H. Any coastal state or public or private person may apply for Federal financial assistance awards for special estuarine research or monitoring projects under subpart G. The announcement of opportunities to conduct research in the System appears on an annual basis in the FEDERAL REGISTER. If a state is participating in the national Coastal Zone Management Program, the applicant for an award under section 315 of the Act shall notify the state coastal management agency regarding the application.

(b) An original and two copies of the formal application must be submitted at least 120 working days prior to the proposed beginning of the project to the following address: Sanctuaries and Reserves Division Ocean and Coastal Resource Management, National Oceanic and Atmospheric Administration, 1825 Connecticut Avenue, NW., suite 714, Washington, DC 20235. Application for Federal Assistance Standard Form 424 (Non-construction Program) constitutes the formal application for site selection, post-site selection, operation and management, research, and education and interpretive awards. The Application for Federal Financial Assistance Standard Form 424 (Construction Program) constitutes the formal application for land acquisition and development awards. The application must be accompanied by the information required in subpart B (predesignation), subpart C and § 921.31 (acquisition and development), and § 921.32 (operation and management) as applicable. Applications for development awards for construction projects, or restorative activities involving construction, must include a preliminary engineering report, a detailed construction plan, a site plan, a budget and categorical exclusion check list or environmental assessment. All applications must contain back up data for budget estimates (Federal and non-Federal shares), and evidence that the application complies with the Executive Order 12372, ''Intergovernmental Review of Federal Programs.'' In addition, applications for acquisition and development awards must contain:

(1) State Historic Preservation Office comments;

(2) Written approval from NOAA of the draft management plan for initial acquisition and development award(s); and

(3) A preliminary engineering report for construction activities.

§ 921.81 Allowable costs.

(a) Allowable costs will be determined in accordance with applicable OMB Circulars and guidance for Federal financial assistance, the financial assistant agreement, these regulations, and other Department of Commerce and NOAA directives. The term ''costs'' applies to both the Federal and non-Federal shares.

(b) Costs claimed as charges to the award must be reasonable, beneficial and necessary for the proper and efficient administration of the financial assistance award and must be incurred during the award period.

(c) Costs must not be allocable to or included as a cost of any other Federally-financed program in either the current or a prior award period.

(d) General guidelines for the non-Federal share are contained in Department of Commerce Regulations at 15 CFR part 24 and OMB Circular A–110.

Copies of Circular A–110 can be obtained from the Sanctuaries and Reserves Division; 1825 Connecticut Avenue, NW., suite 714; Washington, DC 20235. The following may be used in satisfying the matching requirement:

(1) *Site selection and post site selection awards.* Cash and in-kind contributions (value of goods and services directly benefiting and specifically identifiable to this part of the project) are allowable. Land may not be used as match.

(2) *Acquisition and development awards.* Cash and in-kind contributions are allowable. In general, the fair market value of lands to be included within the Reserve boundaries and acquired pursuant to the Act, with other than Federal funds, may be used as match. However, the fair market value of real property allowable as match is limited to the fair market value of a real property interest equivalent to, or required to attain, the level of control over such land(s) identified by the state and approved by the Federal Government as that necessary for the protection and management of the National Estuarine Research Reserve. Appraisals must be performed according to Federal appraisal standards as detailed in Department of Commerce regulations at 15 CFR part 24 and the Uniform Relocation Assistance and Real Property Acquisition for Federal land Federally assisted programs in 15 CFR part 11. The fair market value of privately donated land, at the time of donation, as established by an independent appraiser and certified by a responsible official of the state, pursuant to 15 CFR part 11, may also be used as match. Land, including submerged lands already in the state's possession, may be used as match to establish a National Estuarine Research Reserve. The value of match for these state lands will be calculated by determining the value of the benefits foregone by the state, in the use of the land, as a result of new restrictions that may be imposed by Reserve designation. The appraisal of the benefits foregone must be made by an independent appraiser in accordance with Federal appraisal standards pursuant to 15 CFR part 24 and 15 CFR part 11. A state may initially use as match land valued at greater than the Federal share of the acquisition and development award. The value in excess of the amount required as match for the initial award may be used to match subsequent supplemental acquisition and development awards for the National Estuarine Research Reserve (see also §921.20). Costs related to land acquisition, such as appraisals, legal fees and surveys, may also be used as match.

(3) *Operation and management awards.* Generally, cash and in-kind contributions (directly benefiting and specifically identifiable to operations and management), except land, are allowable.

(4) *Research, monitoring, education and interpretive awards.* Cash and in-kind contributions (directly benefiting and specifically identifiable to the scope of work), except land, are allowable.

§921.82 Amendments to financial assistance awards.

Actions requiring an amendment to the financial assistance award, such as a request for additional Federal funds, revisions of the approved project budget or original scope of work, or extension of the performance period must be submitted to NOAA on Standard Form 424 and approved in writing.

APPENDIX I TO PART 921—BIOGEOGRAPHIC CLASSIFICATION SCHEME

Acadian

1. Northern of Maine (Eastport to the Sheepscot River.)
2. Southern Gulf of Maine (Sheepscot River to Cape Cod.)

Virginian

3. Southern New England (Cape Cod to Sandy Hook.)
4. Middle Atlantic (Sandy Hook to Cape Hatteras.)
5. Chesapeake Bay.

Carolinian

6. North Carolinas (Cape Hatteras to Santee River.)
7. South Atlantic (Santee River to St. John's River.)
8. East Florida (St. John's River to Cape Canaveral.)

West Indian

9. Caribbean (Cape Canaveral to Ft. Jefferson and south.)
10. West Florida (Ft. Jefferson to Cedar Key.)

Louisianian

11. Panhandle Coast (Cedar Key to Mobile Bay.)
12. Mississippi Delta (Mobile Bay to Galveston.)
13. Western Gulf (Galveston to Mexican border.)

Californian

14. Southern California (Mexican border to Point Conception.)
15. Central California (Point Conception to Cape Mendocino.)
16. San Francisco Bay.

Columbian

17. Middle Pacific (Cape Mendocino to the Columbia River.)
18. Washington Coast (Columbia River to Vancouver Island.)
19. Puget Sound.

Great Lakes

20. Lake Superior (including St. Mary's River.)
21. Lakes Michigan and Huron (including Straits of Mackinac, St. Clair River, and Lake St. Clair.)
22. Lake Erie (including Detroit River and Niagara Falls.)
23. Lake Ontario (including St. Lawrence River.)

Fjord

24. Southern Alaska (Prince of Wales Island to Cook Inlet.)
25. Aleutian Island (Cook Inlet Bristol Bay.)

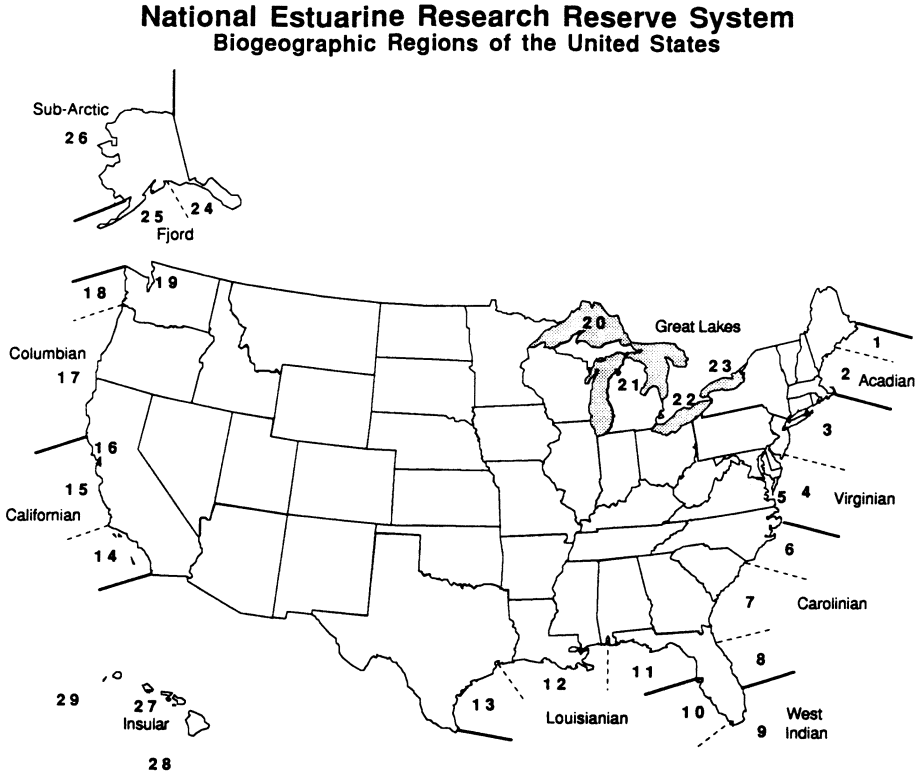
Sub-Arctic

26. Northern Alaska (Bristol Bay to Damarcation Point.)

Insular

27. Hawaiian Islands.
28. Western Pacific Island.
29. Eastern Pacific Island.

FIGURE 1



APPENDIX II TO PART 921—TYPOLOGY OF NATIONAL ESTUARINE RESEARCH RESERVES

This typology system reflects significant differences in estuarine characteristics that are not necessarily related to regional location. The purpose of this type of classification is to maximize ecosystem variety in the selection of national estuarine reserves. Priority will be given to important ecosystem types as yet unrepresented in the reserve system. It should be noted that any one site may represent several ecosystem types or physical characteristics.

Class I—Ecosystem Types

Group I—Shorelands

A. Maritime Forest-Woodland. That have developed under the influence of salt spray. It can be found on coastal uplands or recent features such as barrier islands and beaches, and may be divided into the following biomes:

1. Northern coniferous forest biome: This is an area of predominantly evergreens such as the sitka spruce (Picea), grand fir (Abies), and white cedar (Thuja), with poor development of the shrub and herb leyera, but high annual productivity and pronounced seasonal periodicity.

2. Moist temperate (Mesothermal) coniferous forest biome: Found along the west coast of North America from California to Alaska, this area is dominated by conifers, has relatively small seasonal range, high humidity with rainfall ranging from 30 to 150 inches, and a well-developed understory of vegetation with an abundance of mosses and other moisture-tolerant plants.

3. Temperate deciduous forest biome: This biome is characterized by abundant, evenly distributed rainfall, moderate temperatures which exhibit a distinct seasonal pattern,

well-developed soil biota and herb and shrub layers, and numerous plants which produce pulpy fruits and nuts. A distinct subdivision of this biome is the pine edible forest of the southeastern coastal plain, in which only a small portion of the area is occupied by climax vegetation, although it has large areas covered by edaphic climax pines.

4. Broad-leaved evergreen subtropical forest biome: The main characteristic of this biome is high moisture with less pronounced differences between winter and summer. Examples are the hammocks of Florida and the live oak forests of the Gulf and South Atlantic coasts. Floral dominants include pines, magnolias, bays, hollies, wild tamarine, strangler fig, gumbo limbo, and palms.

B. Coast shrublands. This is a transitional area between the coastal grasslands and woodlands and is characterized by woody species with multiple stems and a few centimeters to several meters above the ground developing under the influence of salt spray and occasional sand burial. This includes thickets, scrub, scrub savanna, heathlands, and coastal chaparral. There is a great variety of shrubland vegetation exhibiting regional specificity:

1. Northern areas: Characterized by Hudsonia, various erinaceous species, and thickets of Myricu, prunus, and Rosa.

2. Southeast areas: Floral dominants include Myrica, Baccharis, and Iles.

3. Western areas: Adenostoma, arcotyphylos, and eucalyptus are the dominant floral species.

C. Coastal grasslands. This area, which possesses sand dunes and coastal flats, has low rainfall (10 to 30 inches per year) and large amounts of humus in the soil. Ecological succession is slow, resulting in the presence of a number of seral stages of community development. Dominant vegetation includes mid-grasses (5 to 8 feet tall), such as Spartina, and trees such as willow (Salix sp.), cherry (Prunus sp.), and cottonwood (Pupulus deltoides.) This area is divided into four regions with the following typical strand vegetation:

1. Arctic/Boreal: Elymus;
2. Northeast/West: Ammophla;
3. Southeast Gulf: Uniola; and
4. Mid-Atlantic/Gulf: Spartina patens.

D. Coastal tundra. This ecosystem, which is found along the Arctic and Boreal coasts of North America, is characterized by low temperatures, a short growing season, and some permafrost, producing a low, treeless mat community made up of mosses, lichens, heath, shrubs, grasses, sedges, rushes, and herbaceous and dwarf woody plants. Common species include arctic/alpine plants such as Empetrum nigrum and Betula nana, the lichens Cetraria and Cladonia, and herbaceous plants such as Potentilla tridentata and Rubus chamaemorus. Common species on the coastal beach ridges of the high arctic desert include Bryas intergrifolia and Saxifrage oppositifolia. This area can be divided into two main subdivisions:

1. Low tundra: Characterized by a thick, spongy mat of living and undecayed vegetation, often with water and dotted with ponds when not frozen; and

2. High Tundra: A bare area except for a scanty growth of lichens and grasses, with underlaying ice wedges forming raised polygonal areas.

E. Coastal cliffs. This ecosystem is an important nesting site for many sea and shore birds. It consists of communities of herbaceous, graminoid, or low woody plants (shrubs, heath, etc.) on the top or along rocky faces exposed to salt spray. There is a diversity of plant species including mosses, lichens, liverworts, and ''higher'' plant representatives.

GROUP II—TRANSITION AREAS

A. Coastal marshes. These are wetland areas dominated by grasses (Poacea), sedges (Cyperaceae), rushes (Juncaceae), cattails (Typhaceae), and other graminoid species and is subject to periodic flooding by either salt or freshwater. This ecosystem may be subdivided into: (a) Tidal, which is periodically flooded by either salt or brackish water; (b) nontidal (freshwater); or (c) tidal freshwater. These are essential habitats for many important estuarine species of fish and invertebrates as well as shorebirds and waterfowl and serve important roles in shore stabilization, flood control, water purification, and nutrient transport and storage.

B. Coastal swamps. These are wet lowland areas that support mosses and shrubs together with large trees such as cypress or gum.

C. Coastal mangroves. This ecosystem experiences regular flooding on either a daily, monthly, or seasonal basis, has low wave action, and is dominated by a variety of salt-tolerant trees, such as the red mangrove (Rhizophora mangle), black mangrove (Avicennia Nitida), and the white mangrove (Laguncularia racemosa.) It is also an important habitat for large populations of fish, invertebrates, and birds. This type of ecosystem can be found from central Florida to extreme south Texas to the islands of the Western Pacific.

D. Intertidal beaches. This ecosystem has a distinct biota of microscopic animals, bacteria, and unicellular algae along with macroscopic crustaceans, mollusks, and worms with a detritus-based nutrient cycle. This area also includes the driftline communities found at high tide levels on the beach. The dominant organisms in this ecosystem include crustaceans such as the mole crab (Emerita), amphipods (Gammeridae), ghost crabs (Ocypode), and bivalve mollusks such

as the coquina (Donax) and surf clams (Spisula and Mactra.)

E. Intertidal mud and sand flats. These areas are composed of unconsolidated, high organic content sediments that function as a short-term storage area for nutrients and organic carbons. Macrophytes are nearly absent in this ecosystem, although it may be heavily colonized by benthic diatoms, dinoflaggellates, filamintous blue-green and green algae, and chaemosynthetic purple sulfur bacteria. This system may support a considerable population of gastropods, bivalves, and polychaetes, and may serve as a feeding area for a variety of fish and wading birds. In sand, the dominant fauna include the wedge shell Donax, the scallop Pecten, tellin shells Tellina, the heart urchin Echinocardium, the lug worm Arenicola, sand dollar Dendraster, and the sea pansy Renilla. In mud, faunal dominants adapted to low oxygen levels include the terebellid Amphitrite, the boring clam Playdon, the deep sea scallop Placopecten, the Quahog Mercenaria, the echiurid worm Urechis, the mud snail Nassarius, and the sea cucumber Thyone.

F. Intertidal algal beds. These are hard substrates along the marine edge that are dominated by macroscopic algae, usually thalloid, but also filamentous or unicellular in growth form. This also includes the rocky coast tidepools that fall within the intertidal zone. Dominant fauna of these areas are barnacles, mussels, periwinkles, anemones, and chitons. Three regions are apparent:

1. Northern latitude rocky shores: It is in this region that the community structure is best developed. The dominant algal species include Chondrus at the low tide level, Fucus and Ascophylium at the mid-tidal level, and Laminaria and other kelplike algae just beyond the intertidal, although they can be exposed at extremely low tides or found in very deep tidepools.

2. Southern latitudes: The communities in this region are reduced in comparison to those of the northern latitudes and possesses algae consisting mostly of single-celled or filamentour green, blue-green, and red algae, and small thalloid brown algae.

3. Tropical and subtropical latitudes: The intertidal in this region is very reduced and contains numerous calcareous algae such as Porolithon and Lithothamnion, as well and green algae with calcareous particles such as Halimeda, and numerous other green, red, and brown algae.

GROUP III—SUBMERGED BOTTOMS

A. Subtidal hardbottoms. This system is characterized by a consolidated layer of solid rock or large pieces of rock (neither of biotic origin) and is found in association with geomorphological features such as submarine canyons and fjords and is usually covered with assemblages of sponges, sea fans, bivalves, hard corals, tunicates, and other attached organisms. A significant feature of estuaries in many parts of the world is the oyster reef, a type of subtidal hardbottom. Composed of assemblages of organisms (usually bivalves), it is usually found near an estuary's mouth in a zone of moderate wave action, salt content, and turbidity. If light levels are sufficient, a covering of microscopic and attached macroscopic algae, such as keep, may also be found.

B. Subtidal softbottoms. Major characteristics of this ecosystem are an unconsolidated layer of fine particles of silt, sand, clay, and gravel, high hydrogen sulfide levels, and anaerobic conditions often existing below the surface. Macrophytes are either sparse or absent, although a layer of benthic microalgae may be present if light levels are sufficient. The faunal community is dominated by a diverse population of deposit feeders including polychaetes, bivalves, and burrowing crustaceans.

C. Subtidal plants. This system is found in relatively shallow water (less than 8 to 10 meters) below mean low tide. It is an area of extremely high primary production that provides food and refuge for a diversity of faunal groups, especially juvenile and adult fish, and in some regions, manatees and sea turtles. Along the North Atlantic and Pacific coasts, the seagrass Zostera marina predominates. In the South Atlantic and Gulf coast areas, Thalassia and Diplanthera predominate. The grasses in both areas support a number of epiphytic organisms.

Class II—Physical Characteristics

GROUP I—GEOLOGIC

A. Basin type. Coastal water basins occur in a variety of shapes, sizes, depths, and appearances. The eight basic types discussed below will cover most of the cases:

1. Exposed coast: Solid rock formations or heavy sand deposits characterize exposed ocean shore fronts, which are subject to the full force of ocean storms. The sand beaches are very resilient, although the dunes lying just behind the beaches are fragile and easily damaged. The dunes serve as a sand storage area making them chief stabilizers of the ocean shorefront.

2. Sheltered coast: Sand or coral barriers, built up by natural forces, provide sheltered areas inside a bar or reef where the ecosystem takes on many characteristics of confined waters-abundant marine grasses, shellfish, and juvenile fish. Water movement is reduced, with the consequent effects pollution being more severe in this area than in exposed coastal areas.

3. Bay: Bays are larger confined bodies of water that are open to the sea and receive strong tidal flow. When stratification is pronounced the flushing action is augmented by

river discharge. Bays vary in size and in type of shorefront.

4. Embayment: A confined coastal water body with narrow, restricted inlets and with a significant freshwater inflow can be classified as an embayment. These areas have more restricted inlets than bays, are usually smaller and shallower, have low tidal action, and are subject to sedimentation.

5. Tidal river: The lower reach of a coastal river is referred to as a tidal river. The coastal water segment extends from the sea or estuary into which the river discharges to a point as far upstream as there is significant salt content in the water, forming a salt front. A combination of tidal action and freshwater outflow makes tidal rivers well-flushed. The tidal river basin may be a simple channel or a complex of tributaries, small associated embayments, marshfronts, tidal flats, and a variety of others.

6. Lagoon: Lagoons are confined coastal bodies of water with restricted inlets to the sea and without significant freshwater inflow. Water circulation is limited, resulting in a poorly flushed, relatively stagnant body of water. Sedimentation is rapid with a great potential for basin shoaling. Shores are often gently sloping and marshy.

7. Perched coastal wetlands: Unique to Pacific islands, this wetland type found above sea level in volcanic crater remnants forms as a result of poor drainage characteristics of the crater rather than from sedimentation. Floral assemblages exhibit distinct zonation while the faunal constituents may include freshwater, brackish, and/or marine species. EXAMPLE: Aunu's Island, American Samoa.

8. Anchialine systems: These small coastal exposures of brackish water form in lava depressions or elevated fossil reefs have only a subsurface connection in the ocean, but show tidal fluctuations. Differing from true estuaries in having no surface continuity with streams or ocean, this system is characterized by a distinct biotic community dominated by benthis algae such as Rhizoclonium, the mineral encrusting Schiuzothrix, and the vascular plant Ruppia maritima. Characteristic fauna which exhibit a high degree of endemicity, include the mollusks Theosoxus neglectus and Tcariosus. Although found throughout the world, the high islands of the Pacific are the only areas within the U.S. where this system can be found.

B. Basin structure. Estuary basins may result from the drowning of a river valley (coastal plains estuary), the drowning of a glacial valley (fjord), the occurrence of an offshore barrier (bar-bounded estuary), some tectonic process (tectonic estuary), or volcanic activity (volcanic estuary).

1. Coastal plains estuary: Where a drowned valley consists mainly of a single channel, the form of the basin is fairly regular forming a simple coastal plains estuary. When a channel is flooded with numerous tributaries an irregular estuary results. Many estuaries of the eastern United States are of this type.

2. Fjord: Estuaries that form in elongated steep headlands that alternate with deep U-shaped valleys resulting from glacial scouring are called fjords. They generally possess rocky floors or very thin veneers of sediment, with deposition generally being restricted to the head where the main river enters. Compared to total fjord volume river discharge is small. But many fjords have restricted tidal ranges at their mouths due to sills, or upreaching sections of the bottom which limit free movement of water, often making river flow large with respect to the tidal prism. The deepest portions are in the upstream reaches, where maximum depths can range from 800m to 1200m while sill depths usually range from 40m to 150m.

3. Bar-bounded estuary: These result from the development of an offshore barrier such as a beach strand, a line of barrier islands, reef formations a line of moraine debris, or the subsiding remnants of a deltaic lobe. The basin is often partially exposed at low tide and is enclosed by a chain of offshore bars of barrier islands broken at intervals by inlets. These bars may be either deposited offshore or may be coastal dunes that have become isolated by recent seal level rises.

4. Tectonic estuary: These are coastal indentures that have formed through tectonic processes such as slippage along a fault line (San Francisco Bay), folding or movement of the earth's bedrock often with a large inflow of freshwater.

5. Volcanic estuary: These coastal bodies of open water, a result of volcanic processes are depressions or craters that have direct and/or subsurface connections with the ocean and may or may not have surface continuity with streams. These formations are unique to island areas of volcanic orgin.

C. Inlet type. Inlets in various forms are an integral part of the estuarine environment as they regulate to a certain extent, the velocity and magnitude of tidal exchange, the degree of mixing, and volume of discharge to the sea.

1. Unrestricted: An estuary with a wide unrestricted inlet typically has slow currents, no significant turbulence, and receives the full effect of ocean waves and local disturbances which serve to modify the shoreline. These estuaries are partially mixed, as the open mouth permits the incursion of marine waters to considerable distances upstream, depending on the tidal amplitude and stream gradient.

2. Restricted: Restrictions of estuaries can exist in many forms: Bars, barrier islands, spits, sills, and more. Restricted inlets result in decreased circulation, more pronounced longitudinal and vertical salinity gradients, and more rapid sedimentation. However, if

the estuary mouth is restricted by depositional features or land closures, the incoming tide may be held back until it suddenly breaks forth into the basin as a tidal wave, or bore. Such currents exert profound effects on the nature of the subtrate, turbidity, and biota of the estuary.

3. Permanent: Permanent inlets are usually opposite the mouths of major rivers and permit river water to flow into the sea.

4. Temporary (Intermittent): Temporary inlets are formed by storms and frequently shift position, depending on tidal flow, the depth of the sea, and sound waters, the frequency of storms, and the amount of littoral transport.

D. Bottom composition. The bottom composition of estuaries attests to the vigorous, rapid, and complex sedimentation processes characteristic of most coastal regions with low relief. Sediments are derived through the hydrologic processes of erosion, transport, and deposition carried on by the sea and the stream.

1. Sand: Near estuary mouths, where the predominating forces of the sea build spits or other depositional features, the shore and substrates of the estuary are sandy. The bottom sediments in this area are usually coarse, with a graduation toward finer particles in the head region and other zones of reduced flow, fine silty sands are deposited. Sand deposition occurs only in wider or deeper regions where velocity is reduced.

2. Mud: At the base level of a stream near its mouth, the bottom is typically composed of loose muds, silts, and organic detritus as a result of erosion and transport from the upper stream reaches and organic decomposition. Just inside the estuary entrance, the bottom contains considerable quantities of sand and mud, which support a rich fauna. Mud flats, commonly built up in estuarine basins, are composed of loose, coarse, and fine mud and sand, often dividing the original channel.

3. Rock: Rocks usually occur in areas where the stream runs rapidly over a steep gradient with its coarse materials being derived from the higher elevations where the stream slope is greater. The larger fragments are usually found in shallow areas near the stream mouth.

4. Oyster shell: Throughout a major portion of the world, the oyster reef is one of the most significant features of estuaries, usually being found near the mouth of the estuary in a zone of moderate wave action, salt content, and turbidity. It is often a major factor in modifying estuarine current systems and sedimentation, and may occur as an elongated island or peninsula oriented across the main current, or may develop parallel to the direction of the current.

GROUP II—HYDROGRAPHIC

A. Circulation. Circulation patterns are the result of combined influences of freshwater inflow, tidal action, wind and oceanic forces, and serve many functions: Nutrient transport, plankton dispersal, ecosystem flushing, salinity control, water mixing, and more.

1. Stratified: This is typical of estuaries with a strong freshwater influx and is commonly found in bays formed from ''drowned'' river valleys, fjords, and other deep basins. There is a net movement of freshwater outward at the top layer and saltwater at the bottom layer, resulting in a net outward transport of surface organisms and net inward transport of bottom organisms.

2. Non-stratified: Estuaries of this type are found where water movement is sluggish and flushing rate is low, although there may be sufficient circulation to provide the basis for a high carrying capacity. This is common to shallow embayments and bays lacking a good supply of freshwater from land drainage.

3. Lagoonal: An estuary of this type is characterized by low rates of water movement resulting from a lack of significant freshwater influx and a lack of strong tidal exchange because of the typically narrow inlet connecting the lagoon to the sea. Circulation whose major driving force is wind, is the major limiting factor in biological productivity within lagoons.

B. Tides. This is the most important ecological factor in an estuary as it affects water exchange and its vertical range determines the extent of tidal flats which may be exposed and submerged with each tidal cycle. Tidal action against the volume of river water discharged into an estuary results in a complex system whose properties vary according to estuary structure as well as the magnitude of river flow and tidal range. Tides are usually described in terms of the cycle and their relative heights. In the United States, tide height is reckoned on the basis of average low tide, which is referred to as datum. The tides, although complex, fall into three main categories:

1. Diurnal: This refers to a daily change in water level that can be observed along the shoreline. There is one high tide and one low tide per day.

2. Semidiurnal: This refers to a twice daily rise and fall in water that can be observed along the shoreline.

3. Wind/Storm tides: This refers to fluctuations in water elevation to wind and storm events, where influence of lunar tides is less.

C. Freshwater. According to nearly all the definitions advanced, it is inherent that all estuaries need freshwater, which is drained from the land and measurably dilutes seawater to create a brackish condition. Freshwater enters an estuary as runoff from the

land either from a surface and/or subsurface source.

1. Surface water: This is water flowing over the ground in the form of streams. Local variation in runoff is dependent upon the nature of the soil (porosity and solubility), degree of surface slope, vegetational type and development, local climatic conditions, and volume and intensity of precipitation.

2. Subsurface water: This refers to the precipitation that has been absorbed by the soil and stored below the surface. The distribution of subsurface water depends on local climate, topography, and the porosity and permeability of the underlying soils and rocks. There are two main subtypes of surface water:

a. Vadose water: This is water in the soil above the water table. Its volume with respect to the soil is subject to considerable fluctuation.

b. Groundwater: This is water contained in the rocks below the water table, is usually of more uniform volume than vadose water, and generally follows the topographic relief of the land being high hills and sloping into valleys.

GROUP III—CHEMICAL

A. Salinity. This reflects a complex mixture of salts, the most abundant being sodium chloride, and is a very critical factor in the distribution and maintenance of many estuarine organisms. Based on salinity, there are two basic estuarine types and eight different salinity zones (expressed in parts per thousand-ppt.)

1. Positive estuary: This is an estuary in which the freshwater influx is sufficient to maintain mixing, resulting in a pattern of increasing salinity toward the estuary mouth. It is characterized by low oxygen concentration in the deeper waters and considerable organic content in bottom sediments.

2. Negative estuary: This is found in particularly arid regions, where estuary evaporation may exceed freshwater inflow, resulting in increased salinity in the upper part of the basin, especially if the estuary mouth is restricted so that tidal flow is inhibited. These are typically very salty (hyperhaline), moderately oxygenated at depth, and possess bottom sediments that are poor in organic content.

3. Salinity zones (expressed in ppt):

a. Hyperhaline—greater than 40 ppt.

b. Euhaline—40 ppt to 30 ppt.

c. Mixhaline—30 ppt to 0.5 ppt.

(1) Mixoeuhaline—greater than 30 ppt but less than the adjacent euhaline sea.

(2) Polyhaline—30 ppt to 18 ppt.

(3) Mesohaline—18 ppt to 5 ppt.

(4) Oligohaline—5 ppt to 0.5 ppt.

d. Limnetic: Less than 0.5 ppt.

B. pH Regime: This is indicative of the mineral richness of estuarine waters and falls into three main categories:

1. Acid: Waters with a pH of less than 5.5.

2. Circumneutral: A condition where the pH ranges from 5.5 to 7.4.

3. Alkaline: Waters with a pH greater than 7.4.

PART 922—NATIONAL MARINE SANCTUARY PROGRAM REGULATIONS

Subpart A—General

Subpart B—Site Evaluation List (SEL)

Subpart C—Designation of National Marine Sanctuaries

Subpart D—Management Plan Development and Implementation

Subpart E—Regulations of General Applicability