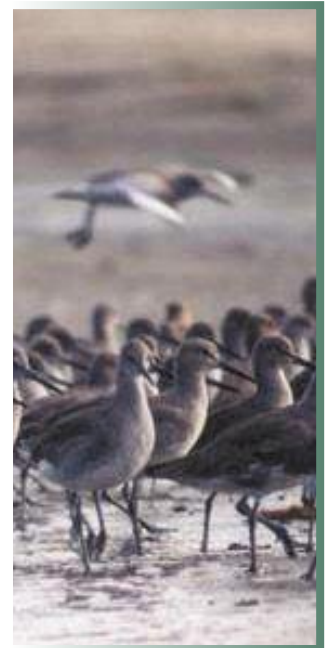

2006-2011

**South Slough National Estuarine
Research Reserve**

Management Plan



**South Slough National Estuarine
Research Reserve**

*Management Plan
2006-2011*



Prepared by the staff of
South Slough National Estuarine
Research Reserve



**South Slough
National Estuarine
Research Reserve**

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Preface

It's been over 30 years since Oregon's South Slough was designated the first of America's National Estuarine Research Reserves. Twice in those years the South Slough staff and management have prepared, with the guidance of the South Slough National Estuarine Research Reserve Management Commission and the National Oceanic and Atmospheric Administration, management plans to guide the work of the reserve.

This document is the third such management plan. It sets out the overall direction of the reserve's programs for the next phase of development.

Since the last management plan was written in 1994, significant changes have occurred at the South Slough NERR. The National Oceanic and Atmospheric Administration (NOAA) has initiated system wide programs to improve the overall effectiveness and utility of the National Estuarine Research Reserve System. These include the Coastal Training Program, the System-Wide Monitoring Program and Estuary Live. In addition, NOAA is considering additional system wide initiatives to support restoration science and estuarine education for teachers. Additionally the South Slough NERR has significantly expanded its physical facilities as well as its core programs of research, education and stewardship.

Under the previous plan, management focused on the southern portion of the South Slough inlet, an isolated, out-of-the-way segment of the Coos Bay. While this was a fantastic place to develop an understanding of the natural dynamics of a single Pacific Northwest estuary, the longstanding goal of the NERR program is to use the national system of reserves as benchmarks, or reference points, in order to improve decision making in estuaries throughout entire regions.

The new management plan's priorities include broadening the focus of South Slough NERR's programs. In the coming years, management and staff will focus on developing new community partnerships and

strengthening existing ones in support of the reserve's mission to improve the understanding and stewardship of Pacific Northwest estuaries.

During its first 30 years reserve staff worked to prepare the South Slough inlet as the reference site by which to develop a basic understanding of how estuaries in our region are shaped and defined by influences of rivers, tides and other natural processes. We are steadily improving the infrastructure to understand the natural dynamics of the South Slough inlet.

No estuary in our region operates in the absence of human activities. Throughout our region we rely on estuaries to support fisheries, accommodate marine and coastal transportation as well as provide recreation and housing. In fact, estuaries could well be considered essential habitat for human civilization.

Now that the reference site has been prepared, it must be compared to other situations. Comparing our understanding of the South Slough inlet to other estuaries in our region will be a huge challenge. The South Slough NERR Management Commission, our advisory committees, and the staff of the reserve, have carefully considered this challenge as we developed the management plan. Our strategy is to think globally and act locally.

The South Slough reserve is an element of the larger South Slough watershed and inlet. These, in turn, are elements of the Coos Bay estuary and watershed. To expand our understanding Pacific Northwest estuaries in general we will begin by improving our understanding of how the South Slough watershed relates to the Coos Bay estuary and its watershed.

This is an exciting development because it will create many new opportunities. The South Slough NERR Management Commission has long desired to build a positive relationship with the communities of the Coos watershed and throughout the region. Over the next 10 years the management commission will focus on working with the communities of Charleston, Coos Bay and North Bend as a partner in meeting the challenges faced by coastal communities that rely on estuaries for food, transportation, and economic and environmental vitality.

Mike Graybill,
Manager

List of Acronyms and Abbreviations

Administrative or regulatory agencies; programs and organizations

ASE	Apprenticeships in Science and Engineering
BLM	United States Bureau of Land Management
CCEC	Charleston Community Enhancement Corporation
CDMO	Centralized Data Management Office, NOAA
CELN	Coastal Environments Learning Network
CFR	Code of Federal Regulations
CMA	Charleston Merchants Association
CPAC	Cooperative Plan Advisory Committee
CSC	Coastal Services Center, NOAA
CTP	Coastal Training Program
CWA	Coos Watershed Association
CZMA	Coastal Zone Management Act
DEQ	Oregon Department of Environmental Quality
DNRA	Oregon Dunes Natural Recreational Area
DOGAMI	Oregon Division of Geology and Mineral Industries
DSL	Oregon Department of State Lands
ECOS	Estuarine and Coastal Sciences Laboratory
EPA	United State Environmental Protection Agency
ERD	Estuarine Reserves Division, NOAA
ESD	Educational Service District
FOSS	Friends of South Slough
GRF	Graduate Research Fellowship (graduate research fellow)
IBIS	Inquiry-Based Information Services
IOOS	Integrated Ocean Observing System
LCDC	Land Conservation and Development Commission

MARE	Marine Activities and Resource Education
MOU	Memorandum of Understanding
MPA	Marine Protected Area
NANOOS	Northwest Association of Networked Ocean Observing Systems
NRCS	Natural Resource Conservation Service
NERR	National Estuarine Research Reserve
NAME	Northwest Association of Marine Educators
NEPA	National Environmental Policy Act
NERRS	National Estuarine Research Reserve System, NOAA
NOAA	National Oceanic and Atmospheric Administration
NYC	Northwest Youth Corps
OAR	Oregon Administrative Rules
OCCDC	Oregon Coastal Conservation and Development Commission
OCEAN	Oregon Coastal Environments Awareness Network
OCMP	Oregon Coastal Management Program
OCRM	Ocean and Coastal Resource Management Office, NOAA
ODF	Oregon Department of Forestry
ODFW	Oregon Department of Fish and Wildlife
OPRD	Oregon Parks and Recreation Department
OIMB	Oregon Institute of Marine Biology
ORS	Oregon Revised Statutes
OSU	Oregon State University
OWEB	Oregon Watershed Enhancement Board
OYCC	Oregon Youth Conservation Corps
PAGIS	Protected Area Geographic Information System
PNCERS	Pacific Northwest Coastal Ecosystems Regional Study
RSP	Restoration Science Program
SCBEC	South Coast Business Employment Corporation
SEA	Shoreline Education for Awareness
SLB	State Land Board
SSMC	South Slough Management Commission

SSNERR	South Slough National Estuarine Research Reserve
SWCD	Soil and Water Conservation District
SWOCC	Southwestern Oregon Community College
SWMP	System-Wide Monitoring Program
UO	University of Oregon
USACE	United States Army Corps of Engineers
USC	United States Code
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
WTRP	Winchester Tidelands Restoration Project

Other acronyms

CDM	coastal decision maker
EIS	environmental impact statement
GIS	geographical information system
K-12	elementary and secondary education
NPS	nonpoint-source pollution
ppt	parts per thousand
SAV	submerged aquatic vegetation
TMDL	total maximum daily load

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Executive Summary



*Coastal fog belt defines
the South Slough
Watershed*

South Slough National Estuarine Research Reserve 2006-2011 Management Plan

Federal regulations require the South Slough National Estuarine Research Reserve (South Slough NERR) have a federally-approved management plan that provides direction for reserve programs. The management plan provides the basis for evaluation of the Reserve pursuant to Section 312 of the Coastal Zone Management Act of 1972. Federal regulations require the management plan be updated every five years. This executive summary provides an overview of the 2006-2011 plan (the third plan revision).

Chapter 1 describes the state-federal administrative partnership that oversees Reserve operations. The South Slough National Estuarine Research Reserve is a 4,771 acre natural area located in the Coos estuary on the south coast of Oregon. It was designated in 1974 as the first unit of the National Estuarine Research Reserve System (NERRS), a network of estuarine habitats managed for long-term research, education, and coastal stewardship. Established by Congress in 1972 as part of the Coastal Zone Management Act, the system is administered as a partnership between the National Oceanic and Atmospheric Administration (NOAA) and the coastal states.

Goals of the National Estuarine Research Reserve System

The CZMA recognizes that coastal resources are of national significance and rapidly disappearing. Section 315 of the Act established the National Estuarine Sanctuary Program. Under this program, healthy estuarine ecosystems which typify different

regions of the United States are designated and managed for long-term research and education. 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.

Biogeographic regions

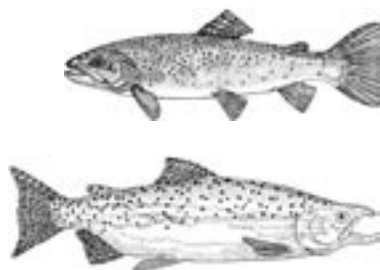
Individual research reserves represent specific biogeographic regions of the United States. A biogeographic region is a geographic area with similar dominant plants, animals and prevailing climate. Each reserve is responsible for implementing research, education, and stewardship programs applicable to its region.

If a proposed site is accepted into the NERRS, it is eligible for NOAA financial assistance on a cost-share basis with the state. The state exercises administrative and management control, consistent with its obligations to NOAA, as outlined in a memorandum of understanding. State partners provide 30% matching funds for NOAA monies dedicated to operating reserves and facilities construction, and 50% match for land acquisition.

The South Slough NERR is administered and managed by the Department of State Lands (DSL), a state agency under jurisdiction of the State Land Board (composed of the Governor of Oregon, the Oregon Secretary of State, and the Oregon State Treasurer). Administrative decisions must comply with the policies of the State Land Board. The DSL holds title to the lands within South Slough NERR and manages them as assets of the Common School Fund for the State of Oregon. The director of the DSL (or a designee) serves as permanent chair of the South Slough NERR Management Commission.



Early marine studies



Tidal channel

Oregon state law provides for the protection and maintenance of South Slough NERR's resources through state policy and designates the South Slough NERR Management Commission as the Reserve's immediate governing body, subject to any agreements between the State of Oregon and NOAA.

While the habitats within the South Slough NERR are protected and the watershed is relatively undeveloped, the Reserve is concerned about several issues which may impact the resources and/or ecological integrity of the South Slough NERR and its watershed. During the coming planning period the Reserve will identify priorities and develop strategies to address the following critical issues:

Biological invasions

Biological invasions pose considerable threat to the ecological integrity of South Slough NERR. As of 1989, over 40 non-native marine, estuarine, and terrestrial plant and animal species have become established in Reserve habitats. In many cases species are so well established or so likely to re-invade, the most realistic policy is simply to control their growth and prohibit introductions of new species where possible.

Water quality

The South Slough estuary receives point source pollutants discharged from waterside businesses in Charleston and private activities along the shoreline or aboard boats. Non-point source pollutants entering the South Slough contain varying levels of fecal coliform bacteria (*E. coli*).

Threatened and endangered species

Native plants and animals, including threatened and endangered species, live within or periodically make use of the South Slough estuary and watershed. Protected species include bald eagle, peregrine falcon, brown pelican, sea-run cutthroat trout, coho salmon, pitcher plant, sea lavender, and salt marsh bird's beak. It is likely that other threatened and endangered species are also present.

Commercial oyster cultivation

About 100 acres of the Reserve's intertidal habitats are leased out by the Oregon Department of Agriculture for commercial oyster culture. Oyster cultivation in South Slough encourages emphasis on water quality.

Vegetation and sediment management

Land uses throughout the watershed and along shorelines significantly affect all parts of the South Slough and Coos estuaries.

Forest management and fire

Current upland management is passive. Although there have been no forest fires in the Reserve since its establishment, and the probability of forest fire remains low due to the limited uses of the Reserve, there is a growing volume of dead and downed wood in the forested uplands.

Harvests of secondary forest products

Gathering forest greenery is permitted for noncommercial purposes. Commercial brush picking is prohibited, but even non-commercial brush picking has the potential to exacerbate forest management problems, including the spread of Port Orford cedar root rot (*Phytophthora lateralis*).

Disaster prevention and response

Spills of oil, chemicals or hazardous materials shipped to or from Coos Bay threaten habitats throughout the ecosystem. The 1994 Coos Bay Geographic Response Plan was tested when the M.V. New Carissa ran aground outside Coos Bay in 1999, spilling approximately 80,000 gallons of fuel oil. Damage to Coos Bay and South Slough was limited more by the spill location and prevailing winds than it was by oil spill protection strategies.

Archeological artifacts and historic structures

The cultural history of South Slough NERR includes Native American and historical settlement sites and structures. The Native American archeological sites and their contents are managed in full compliance with applicable state and federal laws.

Chapter 2 describes the setting of the Reserve within the South Slough watershed, a 19,295 acre sub-basin of the Coos watershed. The Coos estuary is the largest estuary completely within Oregon state lines. The Coos estuary is a drowned river mouth that was submerged as sea level began to rise 20,000 years ago. Heavy winter precipitation results



Field research



Salt marsh replacement

in high discharge of fresh water and sediment. Salt water inflows dominate during the summer when stream flows are low. The chapter describes the climate, geology, hydrology, habitats and plant communities, and cultural history of the Reserve.

Chapter 3 contains the core principles, mission, vision and goals that guide operation of South Slough NERR. Core principles include federal regulations, state policies and strategic planning goals to direct programs and operations over the next five years, in addition to the goals for the National Estuarine Research Reserve System (see above).

Oregon law declares that the maintenance of the South Slough NERR as a “national estuarine sanctuary” is state policy. The policy of the Reserve is to:

- Maintain the integrity of the estuary;
- Protect the estuary from uses and activities, both within and beyond its boundaries, which may alter or affect the ecosystem and its natural dynamic processes;
- Preserve the area for long-term scientific and educational uses.

The NERRS strategic plan provides a framework for the direction taken by the South Slough NERR during the coming planning period:

- Improve coastal decision making by generating and transferring knowledge about coastal ecosystems;
- Enhance and expand the National Estuarine Research Reserve System;
- Increase awareness, use, and support of the reserve system and its estuarine science, education, and stewardship programs.

Goal 9 of the DSL strategic plan, completed in 2003, directs the management of the South Slough NERR to “maintain the integrity of the South Slough ecosystem and improve the understanding and management of Pacific Northwest estuaries through development and implementation of the South Slough NERR Management Plan.”

The mission of the South Slough National Estuarine Research Reserve is to improve the understanding and stewardship of Pacific Northwest estuaries and coastal watersheds.

Guiding Principles

The South Slough NERR Management Commission adopted the following principles to guide the work of South Slough NERR:

- Strengthen the understanding of estuaries in the Pacific Northwest through increased knowledge of the South Slough and the Coos estuaries.
- Solicit and incorporate the advice and partnership of others.
- Prioritize stewardship of the South Slough estuary.
- Develop projects to advance multiple Reserve goals.
- Focus Reserve activities on key audiences and environmental themes.



Habitat restoration

Reserve Goals

The management plan articulates goals for programs and operations during the coming planning period:

Research

- Goal 1. Conduct and coordinate research that increases understanding of ecological dynamics in the different regions of South Slough, Coos Bay, and other Pacific Northwest estuaries.
- Goal 2. Assess and monitor the status of estuarine habitats and biotic indicators in order to track short-term variability and long-term changes in estuarine habitats and communities.
- Goal 3. Provide technical assistance and advisory services that contribute to efficient and effective management of estuaries in the Lower Columbia biogeographic province.

Education

- Goal 1. Expand awareness about coastal environments and the South Slough NERR to enhance interest in the educational programs and resources offered by the Reserve.
- Goal 2. Provide a variety of high-quality educational experiences to facilitate understand of key themes within Pacific Northwest estuaries and coastal watersheds.



Decision-maker workshop



K-12 education

- Goal 3. Develop a broader understanding about the purpose of South Slough NERR and the importance of using science results to inform coastal decision making and take responsible action.

Stewardship

- Goal 1. Manage and restore the habitats and ecosystem processes associated with the South Slough NERR using an adaptive management approach.
- Goal 1. Provide for a diversity of high quality estuarine and coastal habitats representative of the Lower Columbia biogeographic province.
- Goal 1. Collaborate with local, regional, and national agencies and organizations to address natural resource management issues affecting estuaries and coastal watersheds.

Administration

- Goal 1. Develop, refine, and implement an administrative framework that promotes collaboration and enables the reserve to responsibly manage finances and programs and to take full advantage of funding opportunities.
- Goal 2. Provide a stimulating professional environment to ensure that all staff members are adequately trained and strive for outstanding performance and interpersonal relationships.
- Goal 3. Create opportunities for public participation that increase the understanding and stewardship of estuaries, expand the operational capacity of the Reserve, and provide meaningful experiences and benefits to participants.
- Goal 4. Facilitate the development and implementation of clear policy direction and guidance in the management of the Reserve.

Facilities & Public Access

- Goal 1. Revise 1991 Facilities Master Plan.
- Goal 2. Develop and maintain facilities necessary to the programs and operations of the Reserve and that support the needs of visitors and staff.
- Goal 3. Serve as a model for developing, maintaining, and operating facilities that minimize ecological impacts through siting, design, and construction methods and the use of innovative technologies.

Chapter 4 addresses the Reserve's research needs and priorities. Research focuses on understanding estuarine functions and processes and investigates links between watersheds, estuaries and nearshore marine environments.

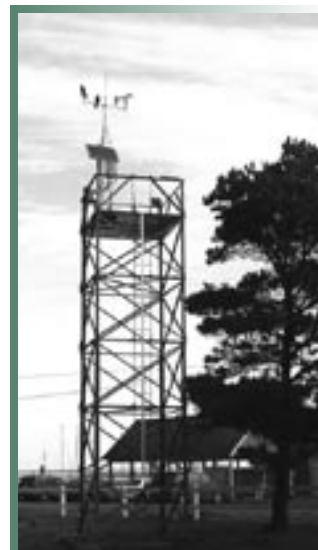
System-Wide Monitoring Program

The System-Wide Monitoring Program (SWMP) collects data from all reserves as a system of national reference sites. Data are compiled at the NERRS Centralized Data Management Office at the Belle W. Baruch Institute for Marine Biology and Coastal Research (University of South Carolina).

Research needs include: spatial habitat information; hydrodynamic information for the Coos estuary; integrated estuarine monitoring of Coos Bay; understanding impacts of oyster farming in estuaries; increased use of South Slough NERR as a research site; and improved capacity to do implement on-site research. Research priorities include assessment and mapping of intertidal and sub tidal estuarine habitats; development of interactive hydrodynamic models of the South Slough and Coos estuaries; development of best management practices for estuarine aquaculture; restoration of native Olympic oysters; salt marsh and eelgrass communities as biotic indicators of estuarine ecosystem function; ecological impacts of aquatic non-indigenous species; community development by dominant estuarine ecological engineering species; physical and biotic links between the Coos estuary and the nearshore Pacific Ocean; determining bacteria sources in estuarine waters.

South Slough NERR will assist in developing the northwest regional coastal component of the Integrated Ocean Observing System, a national network that will provide comprehensive and timely information about the status, condition, and future of the nation's estuaries and coastal waters.

Chapter 5 describes the Reserve's education needs and priorities. Education promotes understanding of estuarine ecosystems and improved coastal stewardship. During the coming planning period South Slough NERR will develop curricula for middle- and high-school students and begin a youth summer science camp. Priorities include increased program participation; developing school-to-work opportunities; internships, professional development for educators, training opportunities for volunteers, improved public programs and interpretive exhibits, interpretive planning, website development, and revised brochures and publications.



*South Slough NERR
weather station*



Evening at South Slough

Coastal Training Program

The CTP provides scientific information and skill-building opportunities to coastal decision-makers, facilitates networking and collaboration among decision makers locally and regionally, and strives to increase understanding of the effects of human activities within the coastal landscape. Training focuses on six priority topics, including watershed habitat restoration, water quality management, invasive species management, visitor impacts, marine protected areas, and climate change in coastal communities.

Estuary Study Program

The Estuary Study Program offers field study for visiting K-12 students. South Slough also participates in the International Brant Monitoring Project, MARE (Marine Activities and Resource Education) a national teacher-training program; Apprenticeships in Science and Engineering (ASE), which provides training for high school youth interested in science and engineering careers; and the Coastal Environments Learning Network (CELN), a network of learning stations focused on local coastal habitats.

Estuary Live

South Slough NERR will continue to participate in Estuary Live, a national, web-based, interactive broadcast for K-12 students.

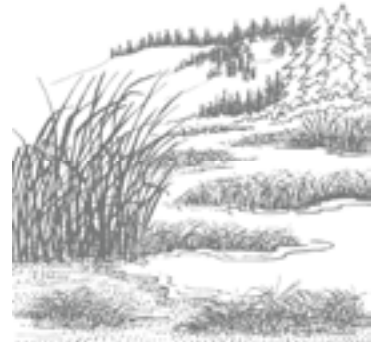
Chapter 6 describes the Reserve's stewardship needs and priorities. Stewardship focuses on estuarine habitat restoration and land acquisition planning. During the coming planning period South Slough NERR will develop a systematic process to assess the ecological health of the reserve, new resource management strategies and land use planning policies, and implement the Cooperative Plan for Watershed Conservation.

Stewardship priorities include reserve trail system planning, developing an operational geographic information system; improved restoration monitoring capacity, expanded community involvement in coastal stewardship, developing a Watershed Stewardship Framework to assess the ecological integrity for the South Slough watershed, implementing the Habitat Restoration and Invasive Species control plans; development of a watershed stewards program, and testing of the Inquiry-Based Information Services.

1

Introduction

South Slough National Estuarine Research Reserve
Management Plan



Chapter 1: Introduction

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Introduction



APRIL 2006

The Mission of South Slough National Estuarine Research Reserve

To improve the understanding and stewardship of Pacific Northwest estuaries and coastal watersheds.

The South Slough National Estuarine Research Reserve (South Slough NERR) is a 4,771 acre natural area located in the Coos estuary on the south coast of Oregon. The Reserve was designated in 1974 as the first unit of the National Estuarine Research Reserve System (NERRS), a network of estuarine habitats protected and managed for the purposes of long-term research, education, and coastal stewardship. Established by Congress in 1972 as part of the Coastal Zone Management Act (CZMA), the NERRS is administered as a partnership between the National Oceanic and Atmospheric Administration (NOAA) and the coastal states (*see Appendix A for 15 C.F.R. Part 921*).

South Slough NERR encompasses a mixture of open water channels, tidal and freshwater wetlands, riparian areas, and forested uplands. The Reserve supports and coordinates research,



South Slough

education, and stewardship programs which serve to enhance a scientific and public understanding of estuaries and contribute to improved estuarine management. Over the past 30 years, South Slough NERR has grown in the depth and scope of its programs and developed facilities to meet the needs of visitors and staff.

This document is the third revision of the South Slough NERR Management Plan and sets a course for the Reserve to promote awareness about estuaries and provide information necessary for effective coastal management for the next five years. During this planning period, the Reserve will focus efforts on applying its resources to issues relevant to the Coos watershed and to activities that will benefit local communities.

The South Slough NERR Management Plan

Federal regulations (*15 C.F.R. Part 921.13*) require each National Estuarine Research Reserve to have a federally-approved management plan that provides direction for reserve programs by identifying management issues and proposed actions. The management plan provides the basis for evaluation of the reserve pursuant to Section 312 of the CZMA. Federal regulations (*15 C.F.R. Part 921.40*) require that reserve management plan be updated every five years.

The initial management plan for South Slough NERR was completed in 1980 and was revised in 1984 and 1994. During the 1994-2003 planning period, South Slough NERR was largely in a development phase for its programs and facilities. With well established programs in place and major construction projects completed, the Reserve now has the ability to address new projects and audiences. The South Slough NERR 2006-2011 Management Plan builds on the capacity that was developed during the last planning period by addressing issues and needs significant to the local community through guidance for the Reserve's programs and operations.

The South Slough NERR 2006-2011 Management Plan provides an overview of the management of the Reserve, a description of the natural, physical, and cultural setting, and outlines the mission, vision, and guiding principles by which the



Skunk cabbage blossom



Skunk cabbage meadow

Mission of the National Estuarine Research Reserve System

The establishment and management, through Federal-state cooperation, of a national system of Estuarine Research Reserves representative of the various regions and estuarine types in the United States. Estuarine Research Reserves are established to provide opportunities for long-term research, education, and interpretation.

15 C.F.R. PART 921.1(A)

Reserve operates. The plan includes information and defines goals for the research, education, and stewardship programs, as well as for the administration and operations of the Reserve.

This management plan has been developed in accordance with the regulations of the National Oceanic and Atmospheric Administration, including all provisions for public involvement. It is consistent with the congressional intent of Section 315 of the Coastal Zone Management Act of 1972, as amended, and the provisions of the Oregon Coastal Management Program.

The National Estuarine Research Reserve System

Section 315 of the C2MA, as amended, established the National Estuarine Research Reserve System as a partnership program between NOAA and the coastal states. The 26 reserves currently in the system represent different biogeographic regions of the United States and encompass more than one million acres of estuarine lands and waters in 21 states and territories (Figure 1.1).

The Estuarine Reserves Division (ERD) of NOAA administers the overall reserve system and provides support at several levels. ERD disburses and oversees expenditures of federal funds for reserve programs and operation. ERD also coordinates and provides guidance for the development of policies and projects



Figure 1.1: National Estuarine Research Reserve System

for the NERRS, and integrates information from individual reserves to support decision making at the national level. As required by federal regulations (*15 C.F.R. Part 921.40*), NOAA periodically evaluates the operations at each reserve for compliance with federal requirements and with the reserve's approved management plan.

Each site in the NERRS is managed on a daily basis by a state agency or university. The programs and operations of a reserve are also dependent on partnerships and the involvement friends groups, volunteers, and advisory groups. Reserve staff work to engage communities in characterizing and addressing coastal management issues. Because reserves are designated to represent large biogeographic regions, they also serve as important sources of information to coastal states with similar estuarine ecosystems.

Goals of the National Estuarine Research Reserve System

The following goals for the National Estuarine Research Reserve System are established by federal regulation (*15 C.F.R. Part 921(b)*):

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

Biogeographic Regions

The reserves that make up the NERRS represent specific biogeographic regions of the United States. A biogeographic region is a geographic area with similar plants, animals dominant and prevailing climate. There are 11 major biogeographic regions around the coast, with 29 subregions, each of which contains several types of estuarine ecosystems (*see Appendix B for NERRS typological classification scheme*). The NERRS currently represents 18 of those subregions. Each reserve is responsible for implementing research, education, and stewardship programs applicable to its region. When complete, the National Estuarine Research Reserve System is designed to include sites representing estuarine hydrologic and biological types characteristic of each biogeographic region.

Reserve Designation and Operation

Under federal law (*16 U.S.C. Section 1461*), a state can nominate an estuarine ecosystem for NERRS status if the site meets the following conditions:

1. The area is representative of its biogeographic region, is suitable for long-term research, and contributes to the biogeographical and typological balance of the NERRS.
2. The law of the coastal state provides long-term protection for the proposed reserve's resources to ensure a stable environment for research.
3. Designation of the site as a reserve will serve to enhance public awareness and understanding of estuarine areas, and provide suitable opportunities for public education and interpretation.
4. The coastal state has complied with the requirements of any regulations issued by the Secretary of Commerce.



Reserve 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. If the proposed site is accepted into the NERRS, it is eligible for NOAA financial assistance on a cost-share basis with the state. The state exercises administrative and management control, consistent with its obligations to NOAA, as outlined in a memorandum of understanding. A reserve may apply to ERD for funds to help support operations, research, monitoring,

education/interpretation, stewardship, development projects, facility construction, and land acquisition. State partners provide 30% matching funds for NOAA monies dedicated to operating reserves and facilities construction, and 50% match for land acquisition.

NERRS System-Wide Initiatives

In order to address coastal and estuarine management issues that are of national concern, ERD coordinates and funds programs that are implemented on a system-wide basis by the NERRS. These initiatives are designed to provide a coordinated approach for addressing coastal issues and flexibility to meet the regional needs and programmatic goals of individual reserves. The NERRS currently supports three system-wide programs: the System-Wide Monitoring Program (SWMP), the Graduate Research Fellowship Program (GRF), and the Coastal Training Program (CTP). Information related to South Slough NERR's participation in these system-wide initiatives is provided in the Research, Education, and Stewardship chapters.

South Slough National Estuarine Research Reserve

On June 27, 1974, the organization that is now known as the South Slough National Estuarine Research Reserve was the first reserve designated under Section 315 of the federal Coastal Zone Management Act. The designation of the "Estuarine Sanctuary", as it was originally known, resulted from the concerted efforts of many concerned citizens and elected officials who recognized the abundant resources and ecosystem values that distinguished the South Slough as a special place suited to the goals of the CZMA.

History

The history of the South Slough NERR began in 1971 when the Coos County Planning Department formed the Barview/Charleston Citizens Committee to assist with the development of a land use plan for the county. The Committee proposed a quarter-mile protection zone around South Slough from Valino Island south, which was approved by the public and the Coos County Planning Commission. After



Early oyster fishing



Scallop fossil

Mission of the Oregon Department of State Lands

To ensure a legacy for Oregonians and their public schools through sound stewardship for lands, wetlands, waterways, unclaimed property, estates and the Common School Fund.

DSL STRATEGIC PLAN (2003)

touring the South Slough area, the Oregon Coastal Conservation and Development Commission (OCCDC) voted to support a moratorium on development south of Valino Island.

In 1972, Congress passed the Coastal Zone Management Act which, with subsequent reauthorizations, recognizes that resources of the coastal zone are of national significance and are rapidly disappearing. Section 315 of the CZMA of 1972 established the National Estuarine Sanctuary Program. Under this program, healthy estuarine ecosystems which typify different regions of the United States are designated and managed as sites for long-term research, and are used as a base for estuarine education and interpretation programs.

In 1973, the OCCDC formed a Sanctuary Committee to select a site along the Oregon coast to be nominated for designation as a sanctuary under this new program and South Slough became the leading contender. Of the twelve sites under consideration by NOAA, South Slough was chosen as the first site in what is now known as the National Estuarine Research Reserve System.

The State of Oregon was awarded \$400,000 in federal funds for initial land acquisition and management of the newly created Sanctuary, which was matched 50-50 with state funds, private contributions, and discounted land sales. After completion of an Environmental Impact Statement, The Nature Conservancy coordinated and negotiated the purchase of property on behalf of the state. The federal guidelines for the program required that the area chosen to be part of the Sanctuary include “water and land units constituting a natural ecological unit” along with the ability to remain a healthy and viable system. By 1978, the Division of State Lands (now the Department of State Lands) had purchased 72.6% of the area originally proposed for the estuarine sanctuary.

In 1986, Congress reauthorized the Coastal Zone Management Act and changed the name of the program designated under Section 315. Consequently, South Slough Sanctuary became South Slough National Estuarine Research Reserve.

State Law

In 1974, Federal Grant In Aid No. 04-4-158-12001 created the partnership between NOAA and the State of Oregon for the initial major purchase of lands for the Reserve. The State agreed to acquire specific lands to create the Reserve, to enact state statutes

to keep ecosystems on those lands intact, and to manage the lands acquired with those funds according to NOAA requirements for National Estuarine Research Reserves.

Oregon state law (*O.R.S. 273.553 et seq., Appendix C*) complements and reinforces federal NERRS regulations by providing for the protection and maintenance of South Slough NERR's resources through state policy. This set of state statutes established management policy for the Reserve and designates the South Slough NERR Management Commission as the Reserve's immediate governing body (*see Administration chapter*). The statutes also provide that management of South Slough NERR is subject to any agreements between the State of Oregon and NOAA.

Oregon Department of State Lands

State statute defines the intent and purpose for the South Slough NERR and designates the Oregon Department of State Lands (DSL) as the lead agency for the Reserve. The Department of State Lands is a state agency under jurisdiction of the State Land Board which is composed of the Governor of Oregon, the Oregon Secretary of State, and the Oregon State Treasurer. All administrative decisions at the Reserve must comply with the policies of the State Land Board.

The Oregon Department of State Lands holds title to the lands within South Slough NERR and manages them as assets of the Common School Fund for the State of Oregon. DSL provides oversight of the day to day management of the Reserve's resources, programs, and operations.

The director of the DSL (or a designee) serves as permanent chair of the South Slough NERR Management Commission.

South Slough NERR Accomplishments 1994-2003

Since its designation in 1974, South Slough NERR has achieved many of the goals and objectives set forth in previous management plans and in the process created a unique program and place. The accomplishments of the Reserve reflect the talent and efforts of a dedicated staff and cooperative efforts with



South Slough NERR Interpretive Center



Old logging railroad pilings

committed partners. The following summarizes major Reserve accomplishments since 1994:

- Completed acquisition of all lands within the administrative boundaries for the Reserve originally proposed in 1974.
- Developed facilities to meet program and visitor needs, including the construction of a maintenance facility, renovation of an existing residential structure to provide temporary housing, the construction of the Estuarine and Coastal Sciences Laboratory (ECOS), and expansion and renovation of the Interpretive Center.
- Established one permanent and six limited-duration positions to support expanded facilities, programs, and grant-funded projects.
- Increased public accessibility to Reserve programs and information by extending the operating hours of the Interpretive Center from five to six days per week throughout the year.
- Completed the Site Profile of the South Slough National Estuarine Research Reserve (final draft), a synthesis of the ecology of the South Slough estuary and research over the past 25 years.
- Increased support for research conducted in the Reserve through participation in the Graduate Research Fellowship program.
- Expanded monitoring efforts to include full implementation of Phase 1 (water quality, weather, dissolved nutrients) of the System-Wide Monitoring Program and the establishment of partnerships to monitor bacterial levels in the South Slough estuary.
- Expanded the number and scope of education programs and activities in order to address a broader range of audiences.
- Established the Coastal Training Program as a means of enhancing the Reserve's ability to provide education for a coastal management audience.
- Provided leadership for the development of the Coastal Environments Learning Network, a multi-institutional effort to provide interpretive opportunities through a regional network of natural environments.
- Implemented the Winchester Tidelands Restoration Project and restored wetland habitats at seven sites.
- Received the NOAA Environmental Hero award in recognition of the Reserve's tidal wetland restoration work.

- Monitored WTRP sites since 1994, resulting in the publication of two papers in peer-reviewed journals and the completion of three graduate theses.

Management Issues

While the habitats within the South Slough NERR are protected and the watershed is relatively undeveloped, the Reserve is concerned about several issues which may impact the resources and/or ecological integrity of the Reserve and its watershed. Through programs in research, education, and stewardship, in addition to partnerships and collaboration with local resource managers, South Slough NERR will strive to address the following resource management and protection issues during the period covered by this plan.

Invasive Species

Biological invasions pose a considerable threat to the ecological integrity of South Slough NERR. As of 1989, over 40 non-native marine, estuarine, and terrestrial plant and animal species have become established in Reserve habitats. Optimal stewardship would eliminate all exotic species from the Reserve entirely. However, in many cases species are so well established within the Reserve, or so likely to re-invade, a more realistic policy is simply to control invasive species' growth and prohibit their introduction into the Reserve where possible.

The Reserve will identify priorities and develop control strategies as part of the Invasive Species Control Plan to be prepared during this planning period (*see Stewardship chapter, page 6-15, Research chapter, page 4-11*). The Coastal Training Program has also identified invasive species as a key area for training (*see Education chapter, page 5-13*). Chemical control of invasive species in the South Slough NERR will be used only if non-chemical means are ineffective and only after it has been determined that inaction will endanger the nature and integrity of the ecosystem. The application of chemical controls must be in accordance with the Administrative Rules (*see Appendix D*) for the Reserve and requires prior approval from the South Slough NERR Management Commission.



Forested uplands



Water Pollution

The South Slough estuary receives a variety of direct point source pollutant discharges, ranging from those generated by waterside businesses in Charleston (i.e., fish processing plant outfalls) to occasional actions by private individuals along the shoreline or aboard boats. Non-point source pollutants enter the estuary indirectly as components of road runoff and runoff from rural and urban activities and industrial sites. Water throughout the South Slough estuary contains varying levels of fecal coliform bacteria which is of particular concern due to commercial oyster operations in the estuary.

South Slough NERR will focus efforts during this planning cycle on developing a better understanding of the sources and movements of nutrients and bacteria in estuarine waters that are associated with human activities in the South Slough watershed (*see Research chapter, page 4-19*). Through the Coastal Training Program, the Reserve will test practical measures to minimize polluted runoff from urbanized portions of the South Slough watershed and will work with partners and the community to address water pollution in the South Slough and Coos (*see Education chapter, page 5-14*).

Threatened and Endangered Species

Native plants and animals, including threatened and endangered species, that live within or periodically make use of the Reserve are significant components of the estuarine ecosystem and associated coastal watershed. The Reserve seeks to provide habitats of sufficient diversity, complexity, and size necessary to sustain these populations and follows state and federal regulations that guide habitat management and recovery strategies for threatened and endangered species.

Protected species within South Slough NERR include bald eagle, peregrine falcon, brown pelican, sea-run cutthroat trout, coho salmon, pitcher plant, sea lavender, and salt marsh bird's beak. It is likely that other threatened and endangered species are also present.

Ongoing habitat restoration work and forthcoming Habitat Restoration and Invasive Species Control Plans for the Reserve will address threatened and endangered species issues during this planning period (*see Stewardship chapter, page 6-15*). South Slough

NERR will continue research on coho salmon in the South Slough estuary and will continue to monitor use of the Reserve by bald eagles and peregrine falcons.

Commercial Oyster Cultivation

Approximately 100 acres of the Reserve's intertidal habitats are leased out by the Oregon Department of Agriculture for commercial oyster culture. The presence of commercial oyster cultivation in South Slough encourages an emphasis on water quality monitoring, and in particular tracking fecal coliform abundance and determining its sources. The Reserve is also involved in researching the interactions between oyster cultivation and intertidal mudflat and eelgrass communities (*see Research chapter, pages 4-15, 4-16*).

Vegetation and Sediment Management

Land uses throughout the watershed and along shorelines can significantly affect all parts of the South Slough and Coos estuaries. Loss of tidal wetlands, activities in riparian areas, dredging and shoreline construction, and forestry practices in the watershed can impact the vegetation, sediments, water quality, hydrodynamics, and critical habitats found in these coastal ecosystems.

The Reserve will continue to collaborate with other resource management agencies and organizations to manage the impacts of land uses in South Slough NERR (*see Appendix E for list of partnerships*). Stewardship activities at South Slough NERR will focus on monitoring changes to wetland vegetation in the Reserve and the results of habitat restoration efforts. The Reserve will continue to work with partners to pursue further habitat restoration projects, with a new focus on the uplands in the Reserve (*see Stewardship chapter, page 6-20*). Education efforts and outreach through the Coastal Training Program are also integral to managing impacts of land uses in the watershed (*see Education chapter*).

Forest Management and Fire

Apart from the guidance offered by the Administrative Rules, the current management of the Reserve's forested uplands is passive, with virtually no intervention in the regrowth of historically harvested areas. Although there have been no forest fires in the



Kunz Marsh restoration project



Douglas fir

Reserve since its establishment, and the probability of forest fire remains low due to the limited uses of the Reserve, there is now a growing volume of dead and downed wood in the forested uplands of South Slough NERR, highlighting the need for some fuel reduction management. The Coos Forest Protection Association and the Coos County Department of Forestry provide fire control services for the Reserve and the surrounding area.

During this planning period, active forest management on Reserve lands will be necessary to provide for the development of high quality coastal forest habitat and to reduce chance of fire in South Slough NERR. Applied research opportunities exist for testing management techniques that accelerate the development of late-successional forest characteristics in Reserve forests. The Reserve has worked with the Coos County forester and other representatives of forest management agencies and organizations in the development of revegetation strategies for historically harvested areas within the

Reserve. A Habitat Restoration Plan will further identify priorities and strategies for restoration of the Reserve's upland forests and the Reserve will convene an advisory group to guide the process (*see Stewardship chapter, pages 6-14, 6-15*).



Port Orford cedar

Harvests of Secondary Forest Products

The Administrative Rules of the Reserve allow limited harvesting of forest greenery, or brush, for non-commercial purposes. Brush picking for commercial purposes is prohibited in the Reserve due to the irreversible damage done to the cedars by over-harvesting. Even limited brush picking, however, has the potential to exacerbate forest management problems, including the spread of Port Orford cedar root rot (*Phytophthora lateralis*), a water-borne fungus that kills Port Orford cedars. The fungus is transmitted directly from infected stands to healthy trees by harvesters' cutting equipment, boots, and vehicle tires.

Because of the threat posed by Port Orford cedar root rot to one of the principal tree species in south coast forest communities, the Reserve will consider amending the Administrative Rules to prohibit both commercial and non-commercial Port Orford cedar bough harvesting in the coming planning period. The Reserve

will provide strategies for addressing problems associated with Port Orford cedar root rot through the Habitat Restoration Plan and Invasive Species Control Plan (see *Stewardship*, page 6-15).

Disaster Prevention and Response

Unexpected natural or human-caused disasters in any part of the Coos estuary can affect or threaten habitat throughout the ecosystem. Among the most potentially devastating disasters are oil or chemical spills, or accidents involving hazardous materials shipped to or from the Oregon International Port of Coos Bay. Strong tidal currents render South Slough particularly vulnerable to any water-borne spills during flood tide.

South Slough NERR participated in the development of spill prevention and contingency response plans by the Coos estuary subcommittee of Oregon Coast Oil Spill and Marine Safety Committee. Spill prevention planning addresses fuel hauling and handling practices; vessel routes, control, and communication procedures; tugboat equipment standards, and recreational boat licensing. Contingency response plans address actions to be taken in the event of a spill and include an overview of habitats, equipment caches, and boom sites.

The Coos Bay Geographic Response Plan (contingency response plan) was finalized in 1994 and was tested in 1999 when the M.V. *New Carissa* ran aground outside Coos Bay, spilling approximately 80,000 gallons of fuel oil. Damage to Coos Bay and South Slough was limited more by the spill location and prevailing winds than it was by oil spill protection strategies. Based on the experience with the *New Carissa* incident, South Slough NERR will participate in updating the Coos Bay Geographic Response Plan.

Archeological Artifacts and Historic Structures

The cultural history of South Slough NERR is rich and includes Native American and historical settlement sites and structures. The Native American archeological sites and their contents are managed in full compliance with applicable state and federal laws, which forbid unauthorized excavation of archeological sites on public lands, impose civil fines for removal, sale or purchase of historic objects, require consultation regarding a site with the appropriate tribe, and provide special protection for burial sites.



Visitors experience
Cape Arago surf



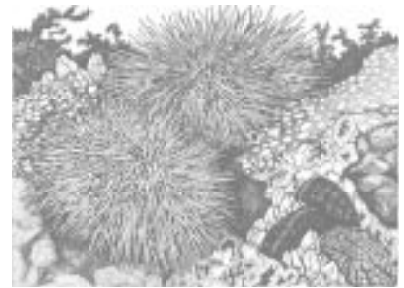
Gulls

South Slough NERR will continue to cooperate with professional archeologists and local tribes to conserve historical sites in the Reserve. During this planning period, management of the cultural heritage of the Reserve will benefit from closer coordination with the local tribes and the inclusion of a tribal representative on the South Slough NERR Management Commission (*see Administration chapter, page 7-12*). Through a planned update to the Facilities Master Plan, the Reserve will give further consideration to the protection and restoration of historic structures (*see Facilities & Public Access chapter, page 8-14*). The Reserve expects to begin implementation of the South Slough NERR Cooperative Plan for Watershed Conservation during this planning period. Several of the parcels identified as areas of interest in this plan include cultural heritage sites.

2

Reserve Setting

South Slough National Estuarine Research Reserve
Management Plan



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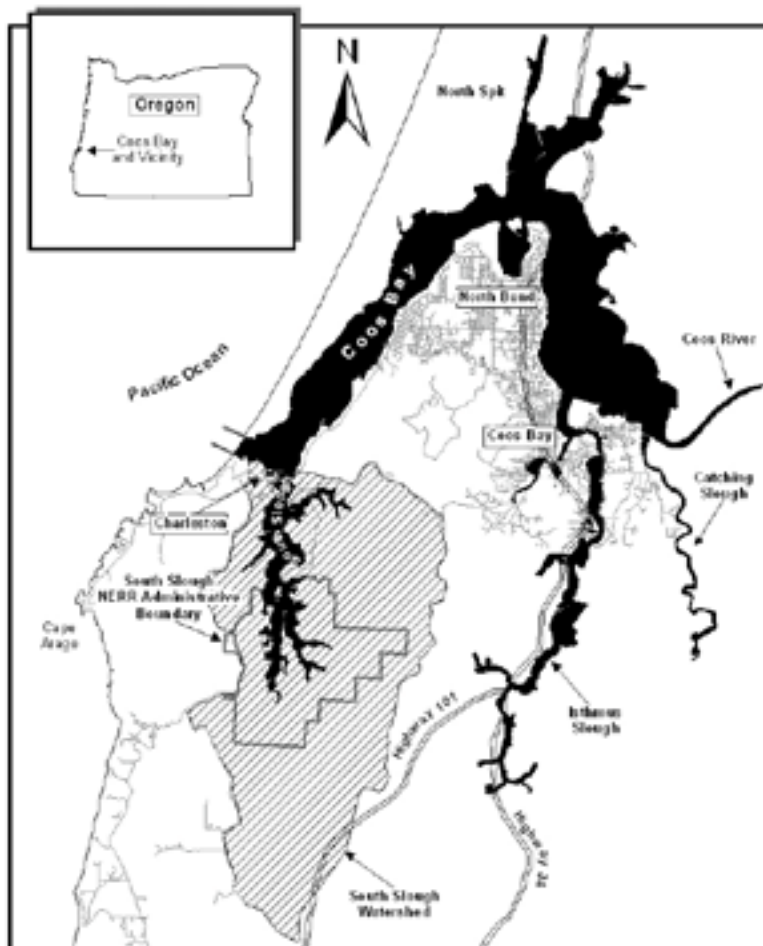


Reserve Setting

South Slough National Estuarine Research Reserve (South Slough NERR) is located in a sheltered arm that forms the southern end of the Coos estuary in southwestern Oregon (*Figure 2.1*). The Reserve and its watershed are significant as a relatively undisturbed area representative of coastal ecosystems in the Pacific Northwest. This overview of the South Slough watershed and the surrounding Coos region illustrates the natural and cultural complexity and richness of the South Slough area. For a more detailed description of the natural setting of the Reserve,

see *The Ecology of the South Slough Estuary: Site Profile of the South Slough National Estuarine Research Reserve*.

Figure 2.1
Coos Estuary and Vicinity



Regional Setting

South Slough NERR is representative of estuaries found in the Lower Columbia biogeographic region, a distinctive section of the Pacific Northwest coast that spans the nearshore waters and estuaries from the mouth of the Columbia River to Cape Mendocino, California (*see Figure 2.2*). The 725 km of coastline found in this region encompasses a diversity of habitat types and biotic communities distinguished by variations in geomorphology, ecological processes, and oceanographic conditions.

South Slough Watershed and Region

The South Slough watershed is a 19,295 acre sub-basin of the Coos watershed drainage (see Figure 2.3). Covering an area of approximately 600 square miles, the Coos estuary is the sixth largest estuary on the Pacific coast of the contiguous United States and the largest estuary completely within Oregon state lines (see Figure 2.3). Like most estuaries found in Oregon, the Coos estuary is a river mouth that drowned as sea level began to rise 20,000 years ago. Drowned river mouth estuaries in this region experience heavy winter precipitation resulting in high discharges of fresh water and sediment. Salt water influences are more pronounced during the summer when freshwater flows are low.

The Coos estuary bifurcates just inside its ocean opening. The main branch, Coos Bay, arches to the north-northeast; the smaller, narrowly enclosed branch of the South Slough inlet turns toward the south. The Coos estuary's main freshwater tributary, the Coos River, enters at the southeastern end of the inverted U-shaped tidal basin. At the southwestern end, the estuary opens to the sea. The ocean mouth of the estuary is defined on the north by the southern tip of a seven-mile long sand spit (North Spit), and on the south by a rocky headland (Coos Head).

The shoreline of the Coos estuary is bordered by the municipalities of Charleston, Barview, North Bend, Coos Bay, Millington, Eastside, and Glasgow, with a collective population of approximately 36,000 people in 2000. The estuary is an important industrial center and shipping port, with the navigational channel routinely dredged to maintain adequate depths for commercial shipping. Extensive tidelands, primarily sand flats, mudflats, and salt marshes, constitute about 60-70% of the surface area of the estuary.



Figure 2.2
Lower Columbia
Biogeographic province

The area of land that drains into South Slough is roughly shield-shaped and approximately twice as long as the slough itself (see *Figure 2.1*). The South Slough watershed is dominated by steep, forested slopes. Major sections of the shoreline are bounded by sandy bluffs. The watershed boundary is defined on the east, south, and west by prominent ridges with numerous small streams draining into South Slough. The southern half of the watershed, beyond the Reserve boundaries, contains the springs and creeks which feed Winchester Creek, the slough's largest tributary stream.



Oregon's South Slough

Many streams enter the slough near the narrow peninsula of Long Island Point. This north-pointing ridge separates the Slough into an eastern branch, Sengstacken Arm, and a western branch, Winchester Arm. These segments of the Slough are fringed with stream-fed marshes.

The shoreline of the northern part of South Slough includes numerous small coves and marshes. The watershed boundary extends eastward around Joe Ney Slough and its tributaries. Most of the land in this area of the watershed is more gently sloped, but with sandy bluffs that abruptly drop to the water. The fishing village of Charleston dominates the shoreline where the South Slough inlet connects to the rest of the Coos estuary. Just north of Long Island Point lies 23-acre Valino Island, which like much of the surrounding land, is a forest capped consolidated dune remnant. The northern administrative boundary of the Reserve crosses the slough immediately north of the island.

Approximately 70% of the South Slough watershed is in private or county ownership with lands that are actively managed for timber production, and 5% is zoned for rural residential occupation. The remaining one-quarter of the watershed, or 4,771 acres, comprises the South Slough National Estuarine Research Reserve.

Environmental Conditions

Climate

The southwestern coast of Oregon experiences two distinct climatic seasons during a typical year. The warm and relatively dry season extends from May through September, with an average rainfall of less than 4 inches (10 cm). A cooler wet season

brings approximately 56 inches (142 cm) of rain to the area from October through April. Regional temperatures typically range between 40° and 75° F (4.5 – 24 °C).

Winds from the north and northwest averaging 17 mph (27 km hr) are typical of the high pressure systems that prevail in summer. In the winter, stormy winds blow from the south and southwest at an average of 15 mph (24 km hr). Storms driven by the southwesterly winds move inland periodically and can deliver 7-10 cm of rainfall during a 24 hour period. Wind velocities during intense storm events can reach hurricane velocities (> 75 mph, 120 km hr). Winds are less intense between winter storm events and generally blow from the north and northwest.

Geology

The hills, flood plains, sand dunes, and headlands that characterize the vicinity of the Coos estuary are the result of a complex series of coastal geomorphic events. The shoreline, landforms, and soils of the area reflect the interactions of tectonic plates over the past 50 million years, changes in sea level, and local weakness in the earth's crust, along with more recent human land use.

Geomorphology

South Slough NERR lies along a geologic fold, or syncline, which bears its name. Due to this formation, the watershed's eastern and western sides are of distinct geologic types, with different elevations and gradients. The eastern shore formation, which rarely exceeds 250 feet, is typical of the larger Coos estuary watershed. Its highly-erodible, Quaternary, marine terraces of unconsolidated to semi-consolidated sand, silt, and clay are gently sloping, and worn down along creek beds to sandstone and siltstone overlain by loamy sand and sandy and silty loam. The western side's Empire Formation, with scattered Quaternary terraces, is unique to the South Slough. Its hard, impermeable marine sandstone rises 370 feet above sea level, in a long, steeply sloping north-south ridge. These western slopes are mantled with sandy and silty loam and loamy sand.

Soils

Sediments in the South Slough watershed and estuarine tidal basin are derived from several sources including terrestrial runoff, oceanic deposition, and biotic origins. The predominant soil type throughout the upland forested areas is silt loam of the Templeton-Salander group with medium to high runoff and erodibility. Sandy marine terraces of the Bullards-Bandon-Blacklock group are also present on the northeastern slopes of the watershed. Soils in the tidally flooded salt marshes are classified as rich organic histosols (*Haagen, 1989*), which typically consist of compacted clay, sand, and fine mud in alternating layers with mineral sand and silt and organic peat materials. Tidal flats in the South Slough estuary are composed of mudflats and sand flats. The organic content of the mudflats is relatively high and they occur in areas of the estuary that experience low tidal energy. Sand flats, in contrast, occur in areas of high tidal energy and have a much lower organic content.

Core sediment samples from several marsh locations in the estuary indicate a buried layer of coarse-grain sand that overlies organic material (*Peterson and Darienzo, 1989; Nelson et al., 1998*), providing evidence that South Slough was inundated by a tsunami about 300 years ago (*Satake et al., 1996*).

Mineral Resources

Due to its marine origins, the South Slough drainage area includes small deposits of black sands where ancient waves and currents concentrated heavy minerals (iron, chromium, minor amounts of gold, titanium, zirconium, platinum and garnet). Two to four thousand feet beneath the Coaledo Formation a U-shaped seam of coal encircles the slough.

Hydrology

The Coos estuary is a drowned river mouth with an estimated surface water area of 12,380 acres (5010 ha). The estuary is relatively shallow, with an average depth of 2 meters below mean low, low water. Broad expanses of tideflats are exposed at low tide. This shallow curving tidal basin thoroughly mixes the fresh and salt water most of the year. Due to seasonally high volumes of fresh water, the estuary becomes partially stratified in the winter, especially where deeper channels have been dredged for shipping.

Tides in the Coos estuary are mixed and follow a semi-diurnal pattern with two high and two low tides per day. Tidal currents are substantial throughout the estuary, with average flows over one meter per second (*Baptista, 1989*). Mean tidal range is 2.3 meters at the mouth of the estuary; the highest tides measure 3.3 meters above mean low, low water and the lowest tides occur at -0.9 meter below mean low, low water (Extreme tidal range is 3.3 meters.)

The major rivers emptying into the estuary are the Coos and the Millicoma, which supply 66% of the freshwater entering the system (*see Figure 2.3*). Freshwater flow into the Coos estuary averages 5500 cubic feet per second (cfs) during winter rains (January to April) and drops to 90 cfs from May through December (*USACE, 1993*). Numerous smaller tributaries also enter the estuary, often through long, shallow inlets, called sloughs. These sloughs typically receive fresh water slowly and in smaller amounts. Some of the smaller streams may have only intermittent flow.

The average water depth in the South Slough is one meter, with the deepest point measuring 5.5 meters. A single narrow channel, approximately 2 meters deep, meanders down the center of the South Slough. Circulation patterns within the South Slough tidal basin are strongly influenced by tidal oscillations, but are complex and poorly understood (*Juza, 1995; Roegner and Shanks, 2001*). The South Slough estuary is well-mixed vertically, except during heavy rainfall events. Maximum tidal velocities at Valino Island are nearly one meter per second, with average current velocities around 0.4 meters per second. The flushing time for the South Slough estuary is estimated at 6-8 tidal cycles, or about 3 days.

Six perennial streams and over 30 intermittent creeks in the South Slough watershed provide a highly seasonal source of fresh water to the estuary (*see Figure 2.4*). The largest drainage system, Winchester Creek, flows north through the watershed into the Winchester arm. Other significant freshwater contributions to



South Slough at low tide

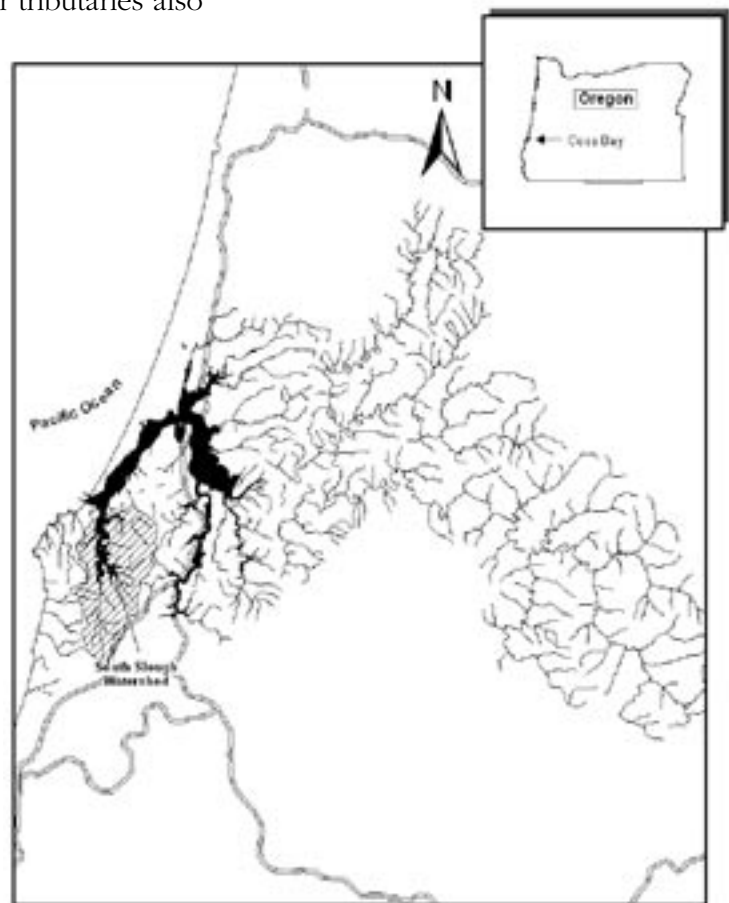


Figure 2.3
Coos Watershed

Many creeks feed the South Slough

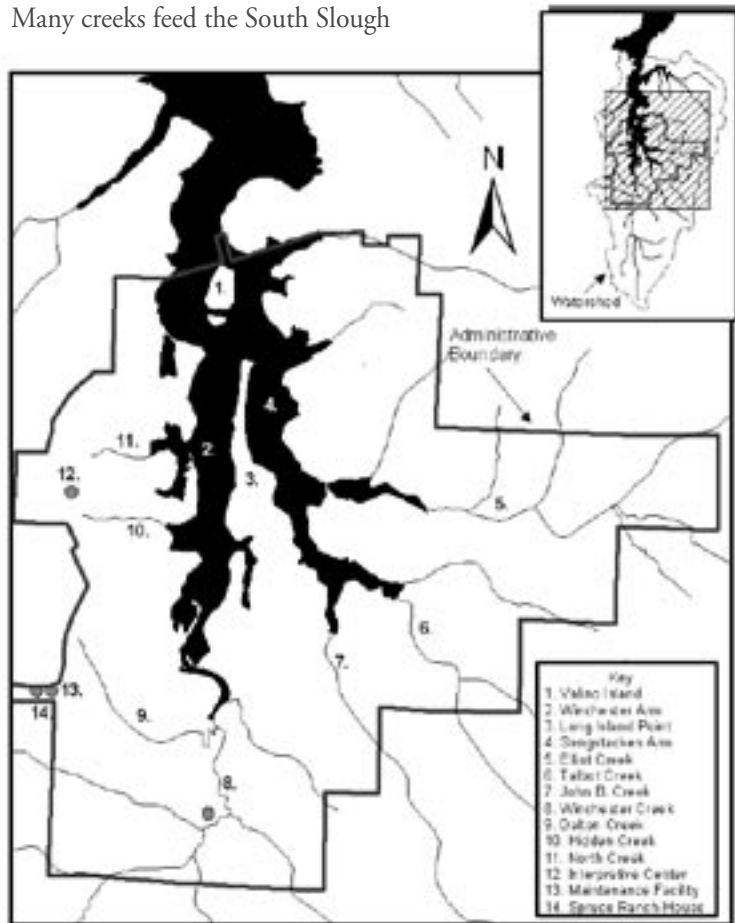


Figure 2.4
South Slough Watershed

the slough flow from the more-gently sloping eastern side of the watershed. Due to highly seasonal variations in freshwater flows, South Slough salinity patterns vary considerably during the year.

Water Quality and Chemistry

The physical, chemical, and biotic characteristics of the water in South Slough vary throughout the estuary on a seasonal and tidal basis, and are influenced by conditions in the nearshore ocean, in the greater Coos estuary, and by freshwater inputs. The water column is generally well-mixed vertically, both near the mouth in the marine dominated region (*Harris et al., 1979; Roegner and Shanks, 2001*) and in the riverine portions of the estuary. Heavy rainfall may cause some stratification of the water column, but the extensive daily exchange of tidal water in the estuary results in mixing and breakdown of vertical stratification.

Strong gradients exist along the marine to freshwater axis for several parameters, including salinity, density, specific conductivity, nutrients, and chlorophyll concentrations. Weaker gradients occur for temperature, dissolved oxygen, and pH.

Habitats and Communities

The Coos estuary and watershed contain a wide range of aquatic, terrestrial, and intertidal habitats, and a corresponding diversity of flora and fauna. The South Slough watershed presents an excellent microcosm of many habitats of the Coos estuary. However, there are three important differences between the Coos and South Slough watersheds: 1) the Coos estuary contains habitat types not found in South Slough; 2) the Coos estuary has experienced sustained more intense development than South Slough; and 3) the Coos estuary generally experiences more tidal flushing and higher salinity than South Slough.

Biotic conditions and communities in the South Slough watershed, especially within the Reserve, are described in detail in *The Ecology of the South Slough Estuary: Site Profile of the South Slough National Estuarine Research Reserve*.

Uplands

Upland regions of the Coos watershed are heavily forested with conifers, predominantly Sitka spruce (*Picea sitchensis*), Douglas fir (*Pseudotsuga menziesii*), western hemlock (*Tsuga heterophylla*), and Port Orford cedar (*Chamaecyparis lawsoniana*). The most prevalent broad-leaf evergreen tree is the red alder (*Alnus rubra*), Pacific wax myrtle (*Myrica pacifica*) and willows (*Salix spp.*) are the subdominant deciduous trees, especially in riparian areas.

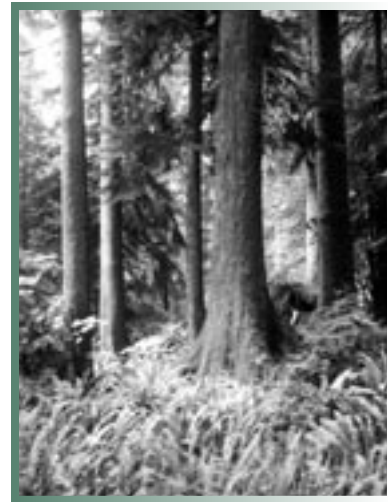
Virtually all of the forested portions of the Coos watershed have been logged at least one time in the past hundred years. Some areas have been logged two or three times. There is widespread evidence of recent clearcuts. Many areas have been replanted exclusively with Douglas fir. Understory plants include salmonberry (*Rubus parviflorus*), thimbleberry (*Rubus spectabilis*), blackberry (both the native *Rubus ursinus*, and non-natives *Rubus procerus* and *Rubus lacianata*), salal (*Gaultheria shallon*), evergreen huckleberry (*Vaccinium ovatum*), red huckleberry (*Vaccinium parvifolium*), and Pacific sword fern (*Polystichum munitum*). The forests contain a rich assemblage of shrubs, ferns, fungi, moss, insects, amphibians, reptiles, birds, and mammals. Deer, elk, beaver, raccoons, porcupines, opossum, owls, and bats are common; black bear, cougar, coyotes, otters, and bobcats inhabit the more remote areas.

Upland areas of the South Slough watershed are typical of the Coos estuary and include 30-to 50-year-old mixed conifer forests, recent clearcuts, and brushy slopes. The South Slough watershed contains a few small, isolated stands of trees over 80 years old, and occasional specimens estimated to be over 100 years old.

Freshwater Habitats

Riparian Zones

An abundance of streams drain the uplands of the South Slough watershed. The riparian areas are typically lined with red alder and occasional small willow. Streamside herbaceous communities are typically lush with Pacific sword fern, deer fern (*Blechnum spicant*) and lady fern (*Atherium filix-femina*), and often include oxalis (*Oxalis oregona*).



Mature Sitka spruce



Beaver pond on
Cox Canyon Creek

Beaver live in and around streams they have dammed, while river otters establish regular pathways for passage into and out of streams. Riparian areas provide raccoons, deer, and other mammals with sources of food and water, and corridors which facilitate movement to and from the estuary. South Slough tributaries provide habitat for amphibians such as the Pacific giant salamander (*Dicamptodon tenebrosus*) the red-legged frog (*Rana aurora*), and many contain populations of resident and anadromous fish, such coho salmon (*Oncorhynchus kisutch*) and cutthroat trout (*Salmo clarki*). Other tributaries in the watershed, for reasons now under study, appear virtually unpopulated by fish. Some streams, buried by brush and sediments from logging activities, no longer run above ground, and their biological attributes are unknown.

Freshwater Ponds and Marshes

Freshwater ponds and marshes in the South Slough watershed usually occur in direct association with streams, although some isolated wetlands exist in the uplands. Most of the larger freshwater wetlands occur in the extensive stream systems of the southern and eastern portions of the watershed. Freshwater marshes frequently form just up and downstream from beaver dams, and in stream sediments which have accumulated immediately above the high tide line. Throughout the South Slough watershed, historic diking activities have artificially produced a number of freshwater marshes and wetlands.

Vegetation characteristic of freshwater wetlands includes sedges (*Carex obnupta*, *Scirpus microcarpus*), cattail (*Typha latifolia*), soft rush (*Juncus effusus*), spike rush (*Eleocharis* spp.), burr reed (*Sparganium emersum*), skunk cabbage (*Lysichitum americanum*), and reed canary grass (*Phalaris arundinace*), an introduced species. Deeper marshes and ponds may contain duckweed (*Lemna minor*) and spatterdock (*Nuphar polysepalum*).

Tidelands

Salt marshes

Salt marshes support large populations of larval and adult invertebrates, which are consumed by the shorebirds and waterfowl that frequent the estuary. The Coos estuary contains less than 10% of its original salt marsh habitat, due to filling, dredging, and other development-related disturbances. Significant portions of the salt marshes remaining in the Coos estuary are found in South Slough. Marshes occur sporadically in the northern end of the Slough, and become larger and more frequent towards its southern reaches. South Slough salt marshes may experience less tidal influence than salt marshes in the main Coos estuary waterbody, but the biological differences between the two areas remain to be studied.

South Slough contains high and low salt marshes which have experienced varying degrees of disturbance and recovery. Plant communities of South Slough salt marshes are typical of the region, and include tufted hairgrass (*Deschampsia caespitosa*), saltgrass (*Distichlis spicata*), pickleweed (*Salicornia virginica*), Baltic rush (*Juncus balticus*), jaumea (*Jaumea carnosa*), and Lyngby's sedge (*Carex lyngbyei*). A few small marshes in the South Slough support the less common salt marsh bird's beak (*Cordylanthus maritimus*) and sea lavender (*Limonium californicum*).

Emergent Islands

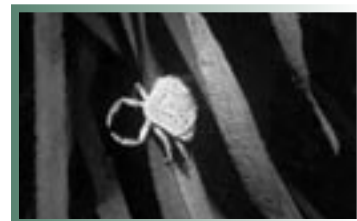
In addition to Valino Island, (described on page 2-3) the South Slough estuary contains several low lying islands of a few hundred square meters, created by deposits of dredge spoils during the past hundred years. These islands appear to provide habitat for invertebrates and some birds, but the biota of these islands, like the biota of the spoil islands elsewhere in the Coos estuary, remains to be studied.

Sand and Mudflats and Channels

The sediments of the Coos estuary are primarily soft and unconsolidated. They create large tideflats which are exposed for varying periods during low tides. Most of the tideflats of the South Slough estuary are composed of mud or muddy sand. The tideflats are often partially covered by mats of *Vaucheria* (a green alga), and typically harbor



Shorebirds find plentiful food on the mudflats



Juvenile Dungeness crab on eelgrass blade



Tidewater flows over sandy flats

cockles (*Clinocardium nuttalli*), gaper (*Tresus capax*), bentnose, and littleneck (*Protothaca staminea*) clams. Ghost shrimp (*Callinassa californica*), mud shrimp (*Neotrypen pugettensis*), juvenile Dungeness crab (*Cancer magister*) also inhabit tideflats in the estuary. The tideflats are a rich feeding ground for a number of small shorebirds, and for great blue herons, egrets, and kingfishers.

Beds of eelgrass (both native *Zostera marina*, and the introduced *Zostera japonica*) cover a significant portion of the Coos estuary bottom. In late summer, up to 160 acres of eelgrass may be found in the Reserve (Figure 2.3), with additional beds of unknown size in the northern part of South Slough. These eelgrass beds, together with deeper tidal channels in the estuary, shelter a large number of fish and invertebrates. The blades of these plants create attachment area for algae, planktonic larvae, and snails. Eelgrass also provides cover for juvenile crab, juvenile ling cod, salmonids, starry flounder, English sole, and other fish and invertebrates. The plants' height allows development of several vertical layers of structurally diverse and productive habitat.

Sandy bottom and sand flats are found adjacent to sandy bluffs and in the higher energy portions of the South Slough. Within the Reserve itself, one sand flat area occurs off the northwest corner of Valino Island, and a second narrow strip runs along part of Long Island Point's west shore. A few coves and bluffs north of the Reserve also have sandy bottoms.

Rocky Bottom

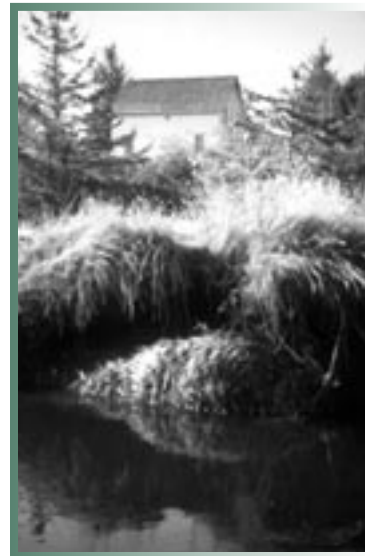
South Slough does not contain large rocky or cobble-bottomed areas. Rocky bottoms are found at the northern end of the watershed, nearest to the higher wave energy areas associated with the Coos estuary mouth, on intertidal land below a small cliff. This small rocky patch is occupied by a diverse community of hard-bottom and boring invertebrates. These include barnacles, mussels, sea anemones, snails, and rockboring clams.

Cultural History

Native Americans

Archeological evidence indicates that the Coos estuary has supported a human population for at least 6,000 years. Along the shores of the South Slough, the Miluk people occupied small villages and seasonal camps starting around 500 AD. The Miluk villages were nearly autonomous gatherings of around 100 people. Permanent dwellings were typically pole frame lodge structures made with split cedar planks and partially set into the ground such that the floor was below ground level. These people hunted, fished, and gathered all the food and fiber needed for subsistence in the South Slough estuary and the surrounding forest. Wooden fish weirs, antler hooks and nets were used to catch a variety of fish, and elk and deer were trapped in large pits. Shell middens found along the shores of South Slough provide evidence that the estuary was a productive place to collect crabs and other shellfish. Berries, seaweed, and edible plants and roots added nutrition and variety to the diet of native peoples. The remains of several villages, wooden fish weirs, and shell middens still exist along Coos estuary shorelines, but in many cases have been buried or substantially disturbed by more recent human development.

When early Euro-American settlers arrived in the South Slough area during the 1850's, the Miluk speaking people lived in the southern part of the Coos estuary. Their area extended west to the ocean and south to the mouth of the Coquille River. The northern parts of the Coos estuary, along the Coos River, and areas as far north as Tenmile Creek were inhabited by the Hanis. The languages of the Miluk and Hanis people were mutually unintelligible but are both included in the Coos family of the Penutian family of languages. South and east of the Miluk area and extending into the upper Coquille watershed lived people who spoke one of the Athabaskan languages, thereby distinguishing them from the Hanis and Miluk people. The descendents of the Coos peoples and other neighboring tribes now comprise the Confederated Tribes of the Coos, Lower Umpqua and Siuslaw Indians. The descendents of the Athabaskan speaking people in the area now comprise the Coquille Indian Tribe. Soon after Euro-American settlement, the original inhabitants of the South Slough area were at first forbidden to own land and were later physically deported from the region.



Fredrickson House and tidal channel

Eventually, in the 1870s, a number of the original families were permitted to claim otherwise undesirable sites, and many made new homes along South Slough or its tributaries. These families' names - Wasson, Talbot, Elliott, Younker, Hanson - survive as place names for creeks, points and coves in the South Slough watershed.

Euro-American Settlement

Euro-American explorers came to the Coos estuary in the late 1700s, and permanent settlement began in the 1850s introducing homesteads and farms, logging operations, and commercial fishing to the area. Due in part to a small gold rush in the 1850s, increasing numbers of new settlers, including Chinese workers and shopkeepers, continued to move into the area, and more aggressive displacement of the original inhabitants began.

Some of the most significant changes in the Coos estuary landscape were initiated in the late 1800s to support the new settlers' way of life. The town of Coos Bay (then Marshfield) was incorporated in 1874. At the convergence of the Coos and South Slough estuaries, the small fishing village of Charleston developed in the late 1880s. Stabilization of the bay mouth was initiated in the late 1880s, and marshes were drained, channels dredged, lowlands filled, and forests logged to support local families in agriculture and marine commerce. Coal was mined in small amounts from 1854 to 1920.

Houses, barns, windmills, a school house, and other structures were built in the coves and low hills of the South Slough watershed through the 1920s, although settlement was never dense. Families supported themselves by logging and ranching, sometimes on a substantial scale. Transportation to and from slough homesteads was almost entirely by boat, and dependent on favorable tides.

Valino Island was the site of a speakeasy during Prohibition, but no physical structures remain visible there today. Many of the early buildings and homesteads in the watershed were abandoned during the Depression and have collapsed or been razed. The sites of several older buildings, including an old schoolhouse and a shake mill, are known, but are now indicated only by small piles of decaying lumber. One of the last buildings of this period still standing in the South Slough watershed is the Fredrickson house.

Land and Resource Use

By 1900, families who had taken up residence in South Slough had substantially altered the landscape to accommodate agricultural, transportation, and logging activities. Marshes were separated from the tides with earthen dikes and drained by ditches. Tide gates kept out salt water and provided drainage of fresh water. The dikes also served as roadways with culverts, as bridges across small streams or marshy areas. Almost all (90%) of the former tidelands of the Coos estuary have been diked or filled to accommodate transportation routes and to create flat land for building and agriculture.

By the 1960s, many tide gates along South Slough were no longer maintained and began to fail, with the earthen dikes gradually eroding and breached in some spots. As a result, former tidelands diked to create crop and pasture lands are in various stages of reversion from uplands and freshwater wetlands to estuarine habitats.

Creeks in the shallower parts of the South Slough watershed were dredged during the early to mid-1900s to accommodate logging and other transportation. Some creek banks are deeply scarred by splash-damming, the practice of damming and then suddenly releasing a volume of water to float logs downstream. Sediments dredged from the channel were piled on the tideflats, and remain as small islands.

Logging

Logging and associated road-building has produced the most marked changes in the upper reaches of the South Slough watershed. All timber in the drainage has been cut at some time, and most of the watershed continues to be managed for commercial forest purposes by public and private owners. Some of the more evident changes caused by logging include a number of clearcuts in various stages of recovery, compacted gravel and dirt roads, and remnants of trestle railroads. Parts of the shoreline and segments of Winchester Creek are lined with pilings which formerly supported short line railroads built to deliver logs to the tidal waters of South Slough. The last large commercial cuts inside Reserve boundaries were made in the late 1970s. A private inholding, subsequently purchased by the Reserve, was logged in 1992.



Early 20th Century logging camp



Dairy cattle

Grazing

Most of the pasturage along South Slough was abandoned in the 1930s, although cattle were grazed on one parcel within the Reserve until the late 1980s. Cattle continue to be grazed just south of the Reserve along South Slough's main tributary, Winchester Creek. Several hobby farms with horses and other livestock operate in the Day Creek and Joe Ney Slough portions of the watershed.

Mining

A small coal mine operated in the southern portion of the South Slough drainage during the late 1800s, but was later abandoned. Large tracts of the South Slough watershed have recently been put under lease by a coal bed methane exploration company. Production testing is underway at two locations.

Fishing and Aquaculture

Commercial and recreational sport fishing are important elements of the local economy. Commercial fishing supports a number of seafood processing plants in Charleston. The Oregon Department of Agriculture leases several thousand acres of state-owned submerged lands in the Coos estuary and South Slough for commercial oyster cultivation. The presence of the commercial oyster industry and recreational clam harvest in the estuary encourages maintenance of excellent water quality.



Commercial fishing is based in Charleston

Residential and Commercial Development

Residential and commercial development is most heavily concentrated in the central to eastern sections of the Coos estuary. The town of North Bend lies inside the curve of the estuary. The town of Coos Bay and its heavy-developed waterfront is immediately south of and adjacent to North Bend. Together, these two towns represent the largest metropolitan area on the Oregon coast (*1991 population: 23,700*).

The fishing village of Charleston marks the northern end of the South Slough watershed, and contains residential areas, a marina, the University of Oregon's Institute of Marine Biology, several fish processing plants, boat repair facilities, and other businesses. The southern part of the South Slough watershed is forest and does not have intensive permanent development.

Local Economy

The economic base of the Coos estuary area is in a state of transition. For more than one hundred years after Euro-American and other settlers arrived, the ocean and once dense forest of the Coos estuary watershed supported commercial fishing, large-scale logging, and an active shipping industry. Currently, however, as those resources and related businesses appear to decline, the economic future is uncertain. Some shipping and commercial and recreational fishing continues, but many of the younger generation are moving elsewhere to find employment. At the same time, recreation and tourism are growth industries in the Coos estuary region. Retirees are also gravitating to the southern Oregon coast, and passive income (i.e., payments from pension plans, social security, stock investments) is a significant new component of the Coos area economy.



Charleston is located at the juncture of the Pacific Ocean and the entrance of the South Slough, at the left.

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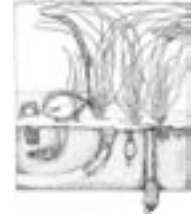
Core Principles

South Slough National Estuarine Research Reserve
Management Plan



Chapter 3: Core Principles

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Core Principles

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The South Slough National Estuarine Research Reserve (South Slough NERR) operates within a framework of state and federal laws and policies. The day-to-day activities of the reserve are guided by a set of Core Principles. These guiding Principles have been adopted by the South Slough NERR Management Commission to direct the programs and set priorities for the programs and operation of the Reserve over the next five years.

Statutory Basis

South Slough National Estuarine Research Reserve is managed through a partnership between the National Oceanic and Atmospheric Administration (NOAA) and the Oregon Department of State Lands (DSL). As one of 26 units in the National Estuarine Research Reserve System (NERRS), operations of the Reserve are guided by the NERRS program goals and state law and policy.



Sword ferns

Federal Regulations: NERRS Program Goals

Federal regulations provide five specific goals for the National Estuarine Research 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.

15 C.F.R. Part 921.1(b)

State Law Establishing Management Policy

Oregon state law (*O.R.S. 273.553*) complements and reinforces the federal regulations for the NERRS by declaring that the maintenance of the South Slough NERR as a “national estuarine sanctuary” is state policy. According to the statute (*see Appendix C*), the management policy for the Reserve is to:

- Maintain the integrity of the estuary.
- Protect the estuary from uses and activities, both within and beyond boundaries, which may alter or affect the ecosystem and its natural dynamic processes.
- Preserve the area for long-term scientific and educational uses.

O.R.S. 273.533.1

Strategic Plans

Both NOAA and DSL are also guided by strategic plans which provide a framework for the direction taken by the South Slough NERR during this planning period.

National Estuarine Research Reserve System Strategic Plan

The NERRS began a strategic planning process in 1994 in an effort to help NOAA achieve its environmental stewardship mission to sustain healthy coasts. The 2003-2008 Strategic Plan for the NERRS was developed by NOAA’s Estuarine Reserves Division (ERD) and the reserves in response to the numerous environmental, programmatic, administrative, and societal factors affecting the reserves. A three-year Action Plan is also developed and revised annually to determine key actions that will be taken to accomplish the goals and objectives of the Strategic Plan.

Goals of the NERRS’s 2003-2008 Strategic Plan:

- *Improve coastal decision making by generating and transferring knowledge about coastal ecosystems.*
- *Enhance and expand the National Estuarine Research Reserve System.*
- *Increase awareness, use, and support of the reserve system and its estuarine science, education, and stewardship programs.*

DSL Strategic Plan

In 2003, the Department of State Lands completed a Strategic Plan to guide its operations over the next 3-5 years.

Goal 9 of this plan, pertaining to the management of the South Slough NERR, is as follows:

Maintain the integrity of the South Slough ecosystem and improve the understanding and management of Pacific Northwest estuaries through development and implementation of the South Slough NERR Management Plan.

South Slough NERR Mission

The mission statement defines why South Slough NERR exists. All Reserve programs and operations should support accomplishment of the mission of South Slough NERR.

The mission of the South Slough National Estuarine Research Reserve is:

To improve the understanding and stewardship of Pacific Northwest estuaries and coastal watersheds.

Guiding Principles

The South Slough NERR Management Commission recognizes that the action plans laid out in this document exist in relation to one another and in the context of external conditions. The Commission has adopted the following principles to guide the overall approach to the work of South Slough NERR. These principles relate to and reinforce the Reserve's mission and are descriptive of the values to which program effectiveness can be attributed.

Principle 1. Strengthen the understanding of estuaries in the Pacific Northwest through increased knowledge about South Slough and the Coos estuary.

The Coos estuary and the communities within its watershed should be the primary focus of the Reserve's research and education activities. By focusing programs on South Slough and the Coos watersheds, the Reserve develops information and expertise that can be used to better understand estuaries and coastal watershed issues throughout the region.



Paddling in South Slough

Principle 2. Solicit and incorporate the advice and partnership of others.

South Slough NERR is committed to creating an atmosphere of cooperation, collaboration, and responsiveness. In the planning stages of a project, the Reserve will request and consider input from diverse sources to ensure the quality of the project, to encourage collaboration, and to improve the likelihood of project success.

Principle 3. Prioritize stewardship of the South Slough estuary.

An intact and functioning estuarine ecosystem is necessary for the long-term research and educational activities of the Reserve. All activities managed or endorsed by the Reserve will be compatible with the mission of the NERR system and with the South Slough NERR Stewardship Program.

Principle 4. Develop projects to advance multiple Reserve goals.

The mission of the Reserve is best served by projects that are designed to address multiple Reserve goals. Staff will keep the Manager and each other advised of proposed initiatives in order to identify opportunities to develop initiatives that meet the goals of more than one program and to avoid possible conflicts between programs.

Principle 5. Structure Reserve activities around key audiences and environmental themes.

Programs at South Slough NERR address common issues in different ways. Programmatic efforts will be coordinated around target audiences and relevant coastal issues in order to most effectively serve the Reserve's constituency.

The staff and the Management Commission recognize that the South Slough Reserve operates in a complex and dynamic context. These dynamics create new opportunities and pose new challenges that are difficult to predict. The Reserve will use the aforementioned principles to guide how we respond to these unforeseen opportunities and challenges.



Skunk
cabbage



Vision

A vision articulates the desired future condition that South Slough NERR will strive to attain. It will assist the Commission and the staff with prioritizing the needs and directing the activities of the Reserve. The vision translates into the goals and objectives of the Reserve's program and operations.

Since the last management plan was completed in 1994, the reserve has developed significant new facilities and programs. The capacity of the staff has also grown. The Reserve's vision is to apply these resources to problem-solving and capacity-building in the local community, with an emphasis on the Coos estuary and watershed.

The vision for South Slough National Estuarine Research Reserve is as follows:

Resources developed at the South Slough NERR will support the informed management of the Coos estuary and watershed providing a model for regional, national, and global coastal management.

Reserve Goals

This management plan articulates a series of Reserve goals that are organized by program and operation area. These goals support the mission of South Slough NERR and reflect the vision of the Reserve.

Research

- Goal 1. Conduct and coordinate research that increases understanding of ecological dynamics in the different hydrogeomorphic regions of South Slough, Coos Bay, and other Pacific Northwest estuaries.
- Goal 2. Assess and monitor the status of estuarine habitats and biotic indicators in order to track short-term variability and long-term changes in estuarine habitats and communities.
- Goal 3. Provide technical assistance and advisory services that contribute to efficient and effective management of estuaries in the Lower Columbia biogeographic province.

Education

- Goal 1. Expand awareness about coastal environments and the South Slough NERR to enhance interest in the educational programs and resources offered by the Reserve.
- Goal 2. Provide a variety of high-quality educational experiences to facilitate understand of key themes within Pacific Northwest estuaries and coastal watersheds.
- Goal 3. Develop a broader understanding by people in the local community about the purpose of South Slough NERR and the importance of using science results to inform coastal decision making and take responsible action.

Stewardship

- Goal 1. Manage and restore the habitats and ecosystem processes associated with the South Slough NERR using an adaptive management approach.
- Goal 2. Provide for a diversity of high quality estuarine and coastal habitats representative of the Lower Columbia biogeographic province.
- Goal 3. Collaborate with local, regional, and national agencies and organizations to address natural resource management issues affecting estuaries and coastal watersheds.

Administration

- Goal 1. Develop, refine, and implement an administrative framework that promotes collaboration and enables the reserve to responsibly manage finances and programs and to take full advantage of funding opportunities.
- Goal 2. Provide a stimulating professional environment to ensure that all staff members are adequately trained and strive for outstanding performance and interpersonal relationships.
- Goal 3. Create opportunities for public participation that increase the understanding and stewardship of estuaries, expand the operational capacity of the Reserve, and provide meaningful experiences and benefits to participants.
- Goal 4. Facilitate the development and implementation of clear policy direction and guidance in the management of the Reserve.

Facilities & Public Access

- Goal 1. Revise 1991 *Facilities Master Plan*.
- Goal 2. Develop and maintain facilities necessary to the operations of the Reserve and that support the needs of visitors and staff.
- Goal 3. Develop, maintain, and operate facilities that minimize environmental impacts and resource consumption by using innovative design, construction methods, and technologies.

4

Research

South Slough National Estuarine Research Reserve
Management Plan



Section 4-Research

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Research

APRIL 2006

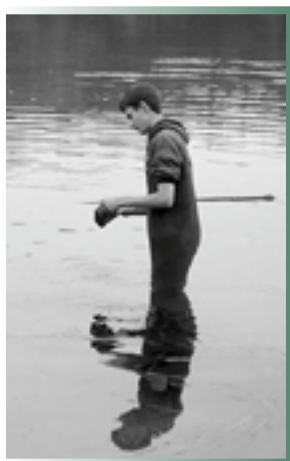
The South Slough National Estuarine Research Reserve (South Slough NERR) is dedicated to scientific investigations that have direct applications toward improvements in regional coastal zone management. The Research Program aims to understand patterns and processes that contribute to healthy coastal and estuarine ecosystems in the Lower Columbia biogeographic province.

During this planning period, the Research Program will focus on applying monitoring data to resource management problems, expanding system-wide monitoring efforts, developing a better understanding of the connections between estuaries and adjacent environments, and promoting the use of the Reserve for research that supports national priority issues and informed management of the Coos estuary and watershed.

Goals

The goals of the South Slough NERR Research Program are to:

- Goal 1.** Conduct and coordinate research that increases understanding of ecological dynamics in the different hydrogeomorphic regions of South Slough, Coos Bay, and other Pacific Northwest estuaries.
- Goal 2.** Assess and monitor the status of estuarine habitats and biotic indicators in order to track short-term variability and long-term changes in estuarine habitats and communities.
- Goal 3.** Provide technical assistance and advisory services that contribute to efficient and effective management of estuaries in the Lower Columbia biogeographic province.



University of Oregon graduate student Ben Grupe collects samples in South Slough

Background

Research programs in the National Estuarine Research Reserve System are designed to facilitate a scientific understanding of estuarine systems and to monitor the baseline conditions of estuaries in the system. In creating the NERRS, Congress indicated that research priorities, objectives, and methodologies should be coordinated nationally for the broadest application of research results and maximum use of the system. The NERRS 2003-2008 Strategic Plan addresses both research and monitoring activities on a national scale.

The national plans that guide research activities at South Slough NERR identify goals, priorities, and implementation strategies for the program, as well as research needs that are specific to the Reserve and the region. This approach, when used in combination with education and stewardship programs, ensures the availability of scientific information that has long-term, system-wide consistency and value to scientists, resource managers, and the public for use in protecting or improving coastal watersheds.

NERRS Research Goals & Funding Priorities

The Research Program at South Slough NERR is designed to realize NERRS goals as defined in federal regulations. These include:

- 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, gathering and making available information necessary for improved understanding and management of estuarine areas.

(15 C.F.R. Part 921.1 (b))

Federal regulations specify that funds from NOAA may be used to support management-related research projects that will enhance a scientific understanding of the Reserve's ecosystems, provide information needed by Reserve management and coastal decision-makers, and improve public awareness and understanding of estuarine ecosystems and estuarine management issues *(15 C.F.R. Part 921.50 (a))*. NOAA research funds are generally intended for projects conducted within the boundaries of the Reserve.



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The primary research objective for the NERRS is the study of the causes and effects of natural and anthropogenically-induced change in the ecology of estuarine and estuarine-like ecosystems.

The Estuarine Reserves Division (ERD) of NOAA has identified five aspects of estuarine ecological change that are to receive particular emphasis for research:

- Eutrophication, effects of non-point source pollution, and nutrient dynamics
- Habitat conservation and restoration
- Biodiversity and the effects of invasive species
- Mechanisms for sustaining resources in estuarine ecosystems
- Economics, sociological, and anthropological research applicable to estuarine ecosystem management

NERRS Research Initiatives

The NERRS has developed system-wide research initiatives to facilitate use of the reserves for scientific investigations that address coastal zone management issues and that further an

understanding of estuarine functions and processes.



Multi-parameter sensor array on water quality datalogger

System-Wide Monitoring Program

The NERRS System-Wide Monitoring Program (SWMP) was initiated in 1995 to provide standardized data on national estuarine environmental trends while allowing the flexibility to address coastal management issues of regional or local concern. The principal mission of the SWMP is to:

Develop quantitative measurements of short-term variability and long-term changes in the integrity and diversity of representative estuarine ecosystems and coastal watersheds for the purposes of contributing to effective coastal zone management.

Components of the System-Wide Monitoring Program

Phase 1. Estuarine Water Quality, Coastal Weather, and Dissolved Nutrients

Phase I constitutes a comprehensive water quality monitoring program, in which basic environmental parameters are measured consistently across the NERRS, and are compiled, synthesized, and disseminated by a Centralized Data Management Office operated by a reserve site. Each reserve, including the South Slough NERR, currently deploys a set of automated instruments to provide continuous measurements of pH, conductivity, temperature, dissolved oxygen, turbidity, water depth, salinity and chlorophyll. In addition, a meteorological station provides real-time measurements of local weather conditions, and monthly samples are taken of dissolved nutrients.

Phase 2. Biotic Monitoring of Estuarine Habitats and Communities

Phase II will constitute a broad-based Biodiversity Monitoring Program in which sites will design ecological surveys to assess the status and trends of locally, regionally, and nationally important critical habitats, species, and functions. This phase of the SWMP will characterize the biotic diversity in estuarine ecosystems by assessing community composition and species abundance and distribution. Protocols for priority directions are currently under development with the intent to implement question-driven biological monitoring.

Phase 3. Land Use and Habitat Change

Phase III will constitute a long-term Land Use Change Analysis in which each site will assess patterns of change in human uses of surrounding watersheds, and relate those activities to environmental processes of immediate management concern (e.g. nonpoint pollution, habitat loss, introduced exotic species, etc.). This component of SWMP will be developed and implemented in order to identify past and future changes in coastal land use patterns and habitats. The phase will examine the link between watershed land use activities and coastal habitat quality by tracking and evaluating the status of estuarine habitat change and watershed land use for all the reserves.



Monitoring water quality in South Slough

The SWMP is designed to enhance the value of the reserves as a system of national reference sites. Data collected by the SWMP are compiled at the NERRS Centralized Data Management Office (CDMO), located at the Belle W. Baruch Institute for Marine Biology and Coastal Research (University of South Carolina). The CDMO serves as a central site for archiving data, storing metadata, and for managing quality assurance and quality control procedures. The SWMP data are formatted to meet the standards of the Federal Geographical Data Committee. The CDMO compiles and disseminates all SWMP data and summary statistics on the Internet (<http://cdmo.baruch.sc.edu/>), where researchers, coastal managers, educators, and the public can access the information.

Graduate Research Fellowships (GRFs)

In 1997, the NERRS initiated funding for a competitive Graduate Research Fellowship (GRF) program. The GRF Program offers qualified master's and doctoral students the opportunity to address scientific questions of local, regional, and national significance. The result is high-quality research focused on improving coastal management issues.

All GRF projects must be conducted in a National Estuarine Research Reserve and enhance the scientific understanding of the reserve's ecosystem. While graduate research fellows receive hands-on expertise, reserve managers and coastal decision-makers receive vital ecological data. The NERRS is focusing on five focus areas for research (*see NERRS Research Goals and Funding Priorities, 4-3*), and proposed GRF projects should address one of the priority estuarine ecosystem topics: (a) eutrophication, effects of non-point source pollution and/or nutrient dynamics; (b) habitat conservation and/or restoration; (c) biodiversity and/or the effects of invasive species; (d) mechanisms for sustaining resources within estuarine ecosystems; (e) economic, sociological, and/or anthropological research applicable to estuarine ecosystem management. Although the areas of coastal and estuarine research interest identified above may be considered national in scope, they relate to and encompass regional and local issues unique to the environments of the individual reserves.

Overview of Research at South Slough NERR

Research efforts at South Slough NERR are focused on understanding estuarine functions and processes along with investigating links between watersheds, estuaries, and nearshore marine environments. Since 1994, the Research Program has implemented multiple components of the SWMP; participated in regional scientific initiatives designed to better understand natural and human induced changes in coastal ecosystems; coordinated studies to investigate the connections between estuaries and the nearshore Pacific Ocean; studied emergent and submerged vegetation and invertebrates found in estuarine environments, and supported graduate student research in the Reserve through the GRF program. The recent addition of laboratory and office space for the Reserve on the campus of the Oregon Institute of Marine Biology (OIMB) provides the Research Program with increased capability to collaborate on projects with visiting researchers and to accommodate graduate students and project staff.

Monitoring

South Slough NERR monitors estuarine water quality, local weather conditions, and biotic communities to further an understanding of the dynamics within the South Slough estuary and to address specific scientific and management questions. Examples of specific questions addressed by the South Slough NERR monitoring program include: (a) To what extent are nutrient dynamics within the estuary driven by oceanic forcing versus watershed inputs? (b) How do the different hydrodynamic regions of the estuary respond to the combined inputs of freshwater and wind stress? (c) Do time-series measurements of estuarine water parameters and weather conditions provide for substantial corrections and validation for the development of numerical hydrodynamic models? (d) How well can hydrodynamic models based on monitoring data predict the flushing time and retention time for bacteria and other biotic components of the South Slough estuary? Monitoring activities also provide information necessary to evaluate the outcomes and effectiveness of ecological field experiments, manipulative restoration treatments (*see Stewardship, Chapter 6*), and other management actions.



GRF students



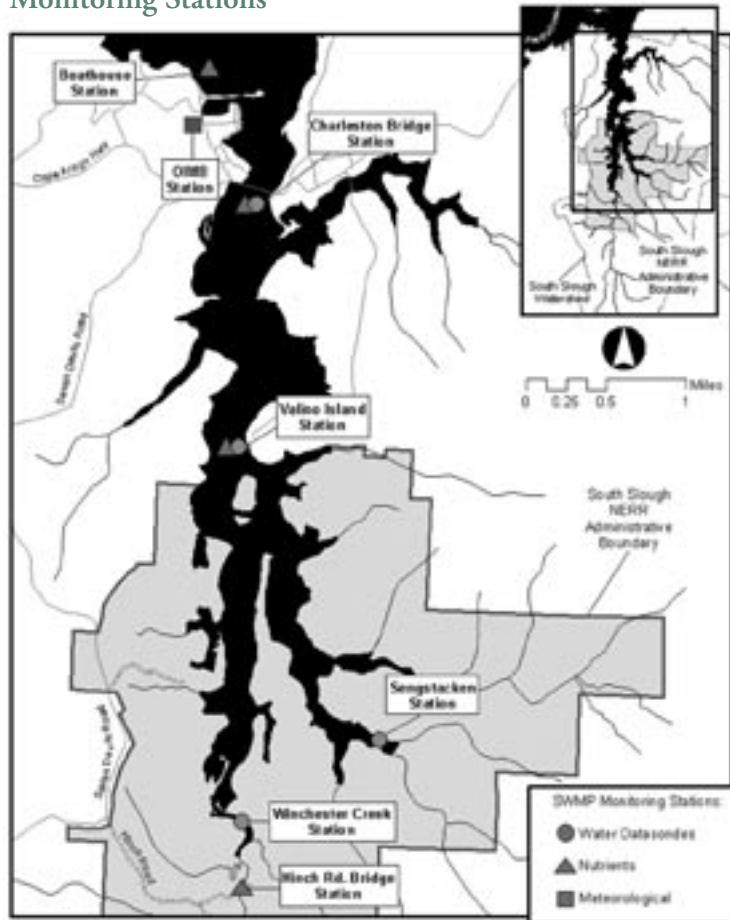
SWMP weather station at OIMB campus

Implementation of the System-Wide Monitoring Program (SWMP)

The Reserve is fully implementing Phase 1 of the SWMP, which includes monitoring estuarine water quality, nutrient concentrations, and local weather (<http://www.nerrs.noaa.gov/monitoring/welcome.html>). Water quality information is gathered at four locations along the estuarine gradient of the South Slough (see Figure 4-1). These stations are equipped with automated data recorders that activate every 30 minutes to record temperature, depth, salinity, conductivity, dissolved oxygen, pH, turbidity, and chlorophyll.

Concentrations of chlorophyll, nutrients, and suspended materials are monitored on a monthly basis. Water samples are collected at four sites along the estuarine gradient during high and low tides. In addition, an automated sampler at one site collects water every 2.5 hours throughout a 25-hour tidal cycle. Samples are analyzed for estuarine nutrient parameters

Figure 4-1: SWMP Monitoring Stations



(ammonium, nitrate, nitrite, phosphate, chlorophyll A, and phaeophytin) as well as total dissolved nutrients, particulate nutrients, silica, total suspended solids, and particulate carbon.

South Slough NERR operates an automated Campbell CR-10X meteorological station on the campus of the Oregon Institute of Marine Biology to provide continuous digital records of local weather conditions, storm events, and rainfall patterns. The station is located near the mouth of the South Slough estuary and records wind direction, velocity, air temperature, relative humidity, barometric pressure, precipitation, and photosynthetically active radiation. System-wide monitoring data, including South Slough reports, are available from the Central Data Management Office at: <http://cdmo.baruch.sc.edu/>.

Project-Based Monitoring

South Slough NERR monitors levels of coliform bacteria in estuarine waters and associated creeks in collaboration with local partners to study point-source and nonpoint-source contamination. Data are provided to the Oregon Department of Agriculture and the Oregon Department of Environmental Quality (DEQ) for use in monitoring shellfish health and the development of total maximum daily load (TDML) pollution limits for estuarine waters.

The Research Program also monitors biotic elements in response to issues of concern and project-specific needs. These efforts currently include annual surveys of eelgrass beds (*Zostera marina*) and their associated communities of infaunal invertebrates, and semi-annual surveys for European green crabs (*Carcinus maenas*), an invasive species.

Partnerships

The Reserve collaborates with local, state, and regional agencies and organizations to make information about coastal ecosystems available to resource managers, policy makers, and coastal communities (see *Appendix E*). In addition to the studies conducted by Reserve scientists, research by outside investigators and students is encouraged and may focus on a wide range of topics. The South Slough NERR research program coordinator has identified three themes to encourage scientific investigations in the Reserve and to provide direction for prospective researchers interested in working in the South Slough NERR (see *Figure 4-2*).

System-wide monitoring data, including South Slough reports, are available from the Central Data Management Office at:

<http://cdmo.baruch.sc.edu/>

Figure 4.2: Research Themes

Theme A: Estuarine Ecology and Assessments of Functional Biotic Diversity

Research projects carried out under this theme address the general questions:

- *What processes determine the composition and distribution of species assemblages and communities in the South Slough estuary?*
- *To what extent are ecological relationships among diverse groups of organisms determined by top-down processes, bottom-up mechanisms, or environmental stress?*

Examples of research projects that focus on estuarine ecology and functional biotic diversity within the South Slough NERR include:

- Biological interactions and ecological relationships among estuarine and marine organisms along the marine-to-freshwater estuarine gradient.
- Development of an early warning system to detect arrival and colonization by new aquatic non-indigenous species.
- Control of estuarine communities by top-down (predation and competition) versus bottom-up (nutrients and productivity) processes.
- Quantitative comparison of primary production in the estuarine water column and by microphytobenthos.
- Role of predation by shorebirds and waterfowl on populations of estuarine invertebrates.

Theme B: Investigation of Links between Land-Margin Ecosystem Elements

Research projects carried out under this theme address the general question: *What are the fundamental transfer mechanisms that provide material, bioenergetic, and life history linkages among upland, estuarine, and marine components of the South Slough ecosystem?*

Examples of specific research projects that focus on links between land-margin ecosystem elements include:

- Hydrodynamic exchange, nutrient dynamics, and material transfer links among nearshore, estuarine, and freshwater components of the South Slough coastal ecosystem.
- Relationships between levels of fecal coliform bacteria, contamination of estuarine shellfish, and land-use activities in adjacent upland habitats.
- Assessment of sediment transport mechanisms, deposition, and erosion between upland sources and the estuarine tidal basin.
- Formation, persistence, and ecological role of bull kelp, *Nereocystis leutkeana*, in estuarine tidal channels, and reciprocal transport of drift algae and eelgrass to marine habitats.
- Oceanic forcing of invertebrate larval supplies and recruitment into estuarine soft-sediment habitats.
- Transport, fate, and role of large wood in estuarine tideflats and salt marshes.

Theme C: Evaluation of the Effects of Human Disturbance within Estuaries

Research projects carried out under this theme address the general question: *What are the primary ecological impacts of chronic anthropogenic disturbance and human-mediated stressors on biotic diversity, populations, communities, and habitat components in the South Slough estuary?*

Examples of applied research projects that focus on evaluation of the effects of human disturbance on the South Slough NERR and other estuaries include:

- Nonpoint source pollution and discharge into tidal channels.
- Ecological role of commercial oyster cultivation on native eelgrass, sediments, invertebrates, and fish.
- Empirical assessment of biological and economic advantages during active and passive restoration of degraded estuarine habitats.
- Influence of shoreline structures, piers, and marinas on salt marshes, eelgrass, shorebirds, and migratory fish.
- Ecological consequences and assessment of climate change in the estuarine and nearshore marine environment.

The South Slough NERR research program strives to address the information needs of a variety of constituents and partner organizations. The type and scope of information necessary to satisfy these needs are diverse. The South Slough NERR research program has developed a prioritized list of research topics (*see Figure 4.3*). The topics are ranked based on degree to which each topic addresses the overall information needs of the diverse constituents in the region. Research topic list and overall priority ranking will be periodically revised using input from key constituents involved in the management of estuaries in the region (*see Objective 3a, page 4-24*).

Accomplishments 1994-2003

The following summarizes the major accomplishments of the SSNERR research program over the past planning period. These accomplishments reflect the efforts of staff and partners involved in research activities at the reserve.

- Completed the *Site Profile of the South Slough National Estuarine Research Reserve*. The publication will be available for distribution in 2006.
- Characterized the ecological effects of mariculture in estuarine habitats through a project funded by the Western Regional Aquaculture Center.
- Coordinated five NOAA research cruises to study the connections between estuaries and the nearshore ocean.
- Fully implemented the first phase of the NERRS System-Wide Monitoring Program.
- Developed and implemented bacterial monitoring projects in partnership with Oregon Department of Environmental Quality, Oregon Department of Agriculture Shellfish Division, Coos Watershed Association, and Marshfield High School.
 - Analyzed 2500 water samples and provided training and analysis for partnering organizations.
 - Examined levels of bacteria in relation to seasonal storm events and land uses, developed time series records, and identified persistent bacterial hot spots in the South Slough.
 - Worked with contractor to identify specific sources of *E. coli* bacteria using microbial source tracking techniques.
 - Contributed data on bacteria to the statewide program for management of commercial shellfish harvest areas.



Recovering a plankton net on the deck of the NOAA research vessel McArthur

- Increased graduate student involvement in South Slough NERR research projects through participation in the NERRS Graduate Research Fellowship program and collaborations with universities.
 - Supported four graduate students conducting research in the Reserve through the GRF program.
 - **Rick Cowlshaw, Ph.D. 2001, University of Oregon**
The role of microzooplankton in planktonic energy transfer and community structure in an estuarine habitat
 - **Eric Milbrandt, Ph.D. 2003, University of Oregon**
Population dynamics in anaerobic bacteria after disturbance: Comparison between restored and natural salt marsh sediments
 - **Jessica Miller, Ph.D. 2004, University of Oregon**
Larval supplies, delivery mechanisms, and recruitment of larval and juvenile fish within non-native eelgrass beds and tidal channels of the South Slough estuary
 - **Mike Berger, Ph.D. 2004, University of Oregon**
Growth, survival, and expression of heat shock proteins in balanomorph barnacles as measures of organismal performance along South Slough estuarine gradients
- Research coordinator maintained academic appointments at the University of Oregon and Oregon State University.
- Participated in the Pacific Northwest Coastal Ecosystems Regional Study (PNCERS), a joint effort of the Oregon Coastal Management Program, Washington Sea Grant, and the National Marine Fisheries Service (NMFS) to study nearshore and estuarine ecosystems of the Pacific coast between the Strait of Juan de Fuca and Cape Mendocino. The South Slough NERR research coordinator served as a principle investigator for this program that was designed to provide information about coastal ecosystem conditions.
- Improved the Reserve's ability to accommodate visiting researchers, graduate students, and project staff and increased capacity to collaborate on research projects through the construction of the South Slough NERR Estuarine and Coastal Science Laboratory (ECOS) facility on the campus of the Oregon Institute of Marine Biology.
- Published 3 papers in peer-reviewed journals, along with agency and project technical reports (*see Appendix G for list of publications*).

Needs

The following summarizes information and programmatic needs that will be addressed by the combined efforts of the Research Program and other program areas in order to meet the research goals of the NERRS and the South Slough NERR:

1. Spatial Habitat Information

Two classification methods derived from the Cowardin (1979) wetland classification system are currently used to define coastal habitats in Oregon. These systems are coarse in scale and do not adequately address the fine scale requirements for habitat mapping in Oregon's relatively steep estuarine tidal basins.

Similarly, existing maps illustrating the distribution and spatial extent of estuarine tideflat habitats and communities throughout the South Slough and Coos tidal basin were developed with field-based information from the 1970s and 1980s and are now outdated. Although the existing habitat maps have been converted to digital GIS files (*see the Oregon Coastal Atlas, <http://www.coastalatlantlas.net>*), the field-based information that forms the basis for the GIS polygons has not been updated. Moreover, the detailed survey of bathymetry of the South Slough tidal basin is now nearly 30 years old.

Accurate information to characterize and map the physical features of the tidal basin, salinity regimes, water column conditions, distribution of plant and animal communities, and shoreline alterations is needed to provide a context for scientific studies and planning throughout the Coos Bay ecosystem.

2. Hydrodynamic Information for the Coos Estuary

A high-resolution numerical model of adequate spatial quality has not been developed for the Coos estuary and its network of tidal sloughs and channels. Development of a predictive, three-dimensional tidal circulation model will serve as a valuable tool to evaluate many pressing issues, including; the dynamics of tidal forcing, sediment transport, dredging, nutrient loading, phytoplankton blooms, bacterial contaminants, oil spill trajectories, retention and export of planktonic larvae, survival of non-native species, and the distribution of plant and animal communities along the gradient from salt water to freshwater environments.



Studying oyster—
eelgrass interactions



Assessment of eelgrass bed in
Coos Bay

3. Integrated Estuarine Monitoring of the Coos Estuary

With growing demand to use quantitative information to support resource management decisions, the number of public and private monitoring programs has increased. Although there are a number of monitoring programs focused on the Coos estuary, no overall plan exists for coordinating these monitoring efforts. Moreover, there is no established avenue for the systematic distribution of monitoring information and research findings to resource managers or the public. A cooperative multi-institution entity is needed to report and archive data and ensure that this information is available to the widest possible audience.

4. Understanding Impacts of Shellfish Mariculture in Estuaries

Additional research is needed to describe ecological relationships between oyster mariculture and estuarine ecosystems. Management agencies have raised concerns regarding the use of non-native species (*Crassostrea gigas*, *C. virginica*, and other species) in commercial mariculture. A focus of this concern has been on the ecological effects of mariculture on the spatial distribution and quality of intertidal and submerged aquatic vegetation, unvegetated mudflats, and the communities of invertebrates, fish, and birds that inhabit the estuarine tideflat habitats. There is a particular need to more fully understand the ecological trade-offs among elements of estuarine communities when large areas are managed for oyster mariculture.

5. Increase Use of South Slough NERR as a Research Site

Currently, use of the South Slough NERR by outside researchers is relatively low in comparison with other NERRS sites. It is more common to receive requests for Reserve staff to assist with research activities outside the Reserve than to receive requests from external parties to conduct research within the administrative boundaries of the South Slough NERR. This constitutes a significant program gap in the intended use of the Reserve as a site to conduct long-term research by outside investigators. These circumstances require continued efforts from the Reserve staff to

actively seek and build partnerships, initiate collaborations, and play a central role in the development of new research initiatives at the local, regional, and national levels.

6. Improved Capacity to Implement On-site Research Efforts

The Research Program manages multiple research grants and projects. The ability to conduct research within the Reserve is often limited by the availability of staff and graduate students to support these efforts. Ongoing efforts, such as the research conducted during NOAA cruises, often require additional short-term assistance to process and analyze data. Additionally, the SWMP has increased in scale and complexity and will integrate additional phases during this planning period. The Reserve needs a strategy to address the staffing demands of projects coordinated through the Research Program.

Research Program 2006-2011

The South Slough estuary encompasses a complete environmental gradient of marine, estuarine, freshwater, and terrestrial habitats. As such, the South Slough NERR provides an ideal setting for studying estuarine processes and issues, investigations that are applicable to coastal zone management problems.

The Research Program will focus efforts during this planning period on increasing use of the Reserve by visiting researchers and as a site for research that has direct relevance to management of the larger Coos estuary. The Reserve will continue to participate in NERRS research initiatives, and plans to expand the SWMP. Additionally, South Slough NERR has identified several priorities for research over the course of this planning period.

Research Priorities

Research activities undertaken by the South Slough NERR will address an interdisciplinary array of estuarine science questions and management issues defined by national priorities and regional needs (*see Figures 4-2 and 4-3*). These research priorities were identified by comparing the estuarine research needs articulated by: (a) the regional coastal zone management program, (b) natural resource agencies within Coos Bay, (c) the South Slough NERR Management Plan, and (d) the NERRS

Figure 4.3: Research Priorities 2006-2011

Research Topic	Overall Priority (Rank)	Activity Status	NERR Research Priority	SSNERR Management	Priority in Coos Bay	Regional CZM Priority
Bioinvasions and Ecological Impacts of Aquatic Non-Indigenous Species	High (1)	Ongoing	High (Invasive Species)	High	High	High
Development of Best Management Practices to Minimize Impacts from Estuarine Aquaculture Activities	High (1)	Ongoing	High (Sustain Resources)	High	High	High
Determination of the Sources of Fecal Coliform Bacteria in Estuarine Tidal Waters	High (1)	Ongoing	High (Non-Point Pollution)	High	High	High
Assessment and Mapping of Intertidal and Subtidal Estuarine Habitats and Communities	High (4)	New	High (Habitat Conservation)	Medium	High	Medium
Interactive Hydrodynamic Model of the South Slough and Coos Estuary	Medium (5)	Ongoing	High (Habitat Conservation)	Medium	Medium	Medium
Salt Marsh and Eelgrass Communities as Biotic Indicators of Estuarine Ecosystem Function	Medium (6)	Ongoing	Medium (Natural Change)	High	Medium	Low
Physical and Biotic Links between the South Slough/Coos Estuary and nearshore Pacific Ocean	Medium (7)	New	High (Eutrophication)	High	High	Medium
Restoration and Recovery of Native Olympic Oysters	Medium (8)	New	High (Restoration)	Medium	Medium	Medium
Cumulative Effects of Multiple Environmental Stressors in Estuarine Systems	Medium (8)	New	High (Habitat Conservation)	Low	Medium	High
Development of Estuarine Ecosystem Models	Low (9)	New	Medium (Natural Change)	Low	Low	High
Community Development within Dominant Estuarine Ecological Engineering Species	Low (10)	Ongoing	Medium (Natural Change)	Low	Low	Low

Strategic Plan for research (*Figures 4-2 and 4-3*). Priority research issues will be addressed by Reserve staff, visiting researchers and graduate students, and through collaborations with partners and other interested groups. Funding will be solicited to address the following priority research issues:

Assessment and Mapping of Intertidal and Subtidal Estuarine Habitats and Communities

The Reserve will participate in an environmental characterization, biotic inventory, and mapping effort of the estuarine habitats and communities found in the South Slough, and will facilitate the development of similar products for the greater Coos estuary (*see Need #1, page 4-10*).

Interactive Hydrodynamic Model of the South Slough and Coos Estuary

South Slough NERR will seek partnerships to develop and validate a hydrodynamic model of the Coos Estuary that will link movement of the estuarine waters with time-series measurements for several ambient water parameters. The circulation of water is fundamentally important to the ecological processes and commercial activities in the Coos Estuary. Hydrodynamics within the Coos estuary and South Slough are complex and are affected by perturbations of the shoreline and bathymetry of the tidal basin, tidal forcing from the ocean, local wind conditions, and inputs from the watershed. Information about estuarine hydrodynamics is essential to many of the decisions that influence the management of coastal areas (*see Need #2, page 4-11*). Data from the SWMP at South Slough NERR (*see SWMP, page 4-6*), will be used to support model development.

Development of Best Management Practices for Estuarine Mariculture Activities

Extensive areas of estuarine tidelands in the Pacific Northwest are currently used for commercial cultivation of Pacific oysters (*C. gigas*). Coastal mariculture practices, however, have recently come under scrutiny regarding the potential impacts oyster mariculture may have on estuarine ecosystems.

Over the past 15 years, South Slough NERR has studied the effects of oyster mariculture and will seek support

for additional research on this issue. Future research will emphasize comparing and contrasting ecological impacts of various oyster mariculture methods in order to develop best management practices for the industry.

Restoration and Recovery of Native Olympia Oysters

The research program at the South Slough NERR will prioritize research focused on the restoration of self-sustaining populations of native Olympia oysters (*Ostreola conchaphila*) in Coos Bay and South Slough. Efforts will focus on investigating the genetic identity of potential brood stock sources, transplant and cultivation techniques, life history patterns and the resistance of *O. conchaphila* to colonization by non-indigenous species, and ecological interactions between native oyster reefs and tidelflat communities.

Olympia oysters, historically abundant in the Coos estuary and South Slough, became locally extinct prior to written history possibly due to basin-wide changes in sedimentation. Since that time, aquatic habitats in Coos Bay have been degraded by the cumulative effects of sedimentation, bark decay, dredging, diking, filling, domestic and industrial pollution, and by colonization by non-indigenous aquatic species. Despite these changes, water column and sediment conditions have improved considerably within the tidal basin to the point where they are now conducive to the recovery of native oysters. Small populations of *O. conchaphila* have become re-established in the Coos estuary over the past two decades in the low intertidal and shallow subtidal zone.



Salt Marsh and Eelgrass Communities as Biotic Indicators of Estuarine Ecosystem Function

South Slough NERR will build on past and current research projects to further investigate the dynamics of salt marshes and eelgrass beds within the South Slough and greater Coos Bay. Research will focus on understanding how the density, productivity, and spatial extent of emergent and submerged vegetation fluctuates over time in Pacific Northwest estuaries in response to large-scale changes in nearshore ocean conditions as well as anthropogenic disturbances.

Emergent tidal marshes and submerged aquatic vegetation (SAV) are critically important habitats in the South Slough estuary. Salt marshes and eelgrass beds are widely recognized as indicators of coastal ecosystem health, contributing to fundamental ecological processes including the production and decomposition of organic matter, cycling of organic and inorganic nutrients, alteration of hydrologic flow patterns, and improvement of estuarine water quality.

Despite the recognized value of emergent tidal wetlands and SAV, the spatial extent, distribution, biotic diversity, and ecosystem functions have not been fully described and documented for these communities in the South Slough estuary (*see Need #1, page 4-10*).

Bioinvasions and Ecological Impacts of Aquatic Non-Indigenous Species

South Slough NERR will continue to monitor the appearance, abundance, and distribution of non-indigenous species. The Reserve will prioritize detecting the arrival of new non-native species and will investigate the ecological impacts of aquatic invasive species on estuarine habitats and native estuarine communities.

Biological invasions pose a considerable threat to the ecological integrity of the South Slough and Coos estuaries. The South Slough tidal basin, including the Reserve, is inhabited by nearly 50 species of aquatic non-indigenous organisms, and over 100 aquatic non-indigenous species have been identified in the adjacent waters of Coos Bay. Coos Bay and the South Slough are susceptible to accelerated rates of invasion by new species due to international shipping, interstate commerce, shellfish mariculture, and recreational activities.

Community Development by Dominant Estuarine Ecological Engineering Species

Several organisms function as dominant ecological engineering species in the South Slough estuary. This research describes the functional role of estuarine ecological engineering species in tideflat communities. These include burrowing shrimp (*Neotrypaea californiensis* and *Upogebia pugettensis*), eelgrass (*Zostera marina* and *Z. japonica*), and Pacific oysters (*C. gigas*). The establishment, maintenance,



and decline of these distinct communities is particularly interesting because they can exist as alternative states in the lower- to mid-intertidal zone of unconsolidated tideflats. Although the upper and lower boundaries of these communities appear to be established by physical and biotic factors, respectively, the lateral extents of these communities appear to fluctuate dramatically over time and to be determined to some extent by changes in estuarine conditions and characteristics of the communities themselves. For example, preliminary observations within several Oregon estuaries suggest that the spatial distribution of burrowing shrimp populations may be determined by a combination of salinity tolerances, predation, and larval recruitment.

Physical and Biotic Links between the South Slough, Coos Estuary and the Nearshore Pacific Ocean

The research program at the South Slough NERR will prioritize efforts to describe the physical and biotic linkages between the protected waters of the Coos, Coquille and Umpqua estuaries and the nearshore Pacific Ocean. These efforts will focus on continued acquisition of data and seeking assistance to analyze data collected during five previous NOAA supported research cruises.

Since 1995, South Slough NERR has been involved in research to improve the understanding of the dynamics of nearshore ocean/estuary connections in the Pacific Northwest region (*see Need #2, page 4-11*), and to shed new light on the ecological consequences of ocean forcing for special interest species including Dungeness crabs (*C. magister*), Burrowing shrimp (*N. californiensis*), Pacific salmon and groundfish.

Future research cruises planned for alternating years will continue these investigations. NOAA ship time has been requested for the years 2006, 2008, and 2010. This research will focus on characterizing the spatial and temporal variability of continental shelf waters from two to 50 miles offshore, the conditions and dynamics at the mouths of estuaries, and immediately offshore from rocky headlands and sandy beaches.

Surveys of the ocean transects will be repeated whenever possible to describe changes in nearshore water column conditions over short (seasonal) time scales and longer time scales (El Niño - Southern Oscillation, Pacific Decadal Oscillation). Simultaneous characterization of estuarine waters within Coos Bay/South Slough will provide direct measures of the extent of the nearshore ocean influence on tidal waters in Oregon.

Determination of Microbial Dynamics in Estuarine Tidal Waters

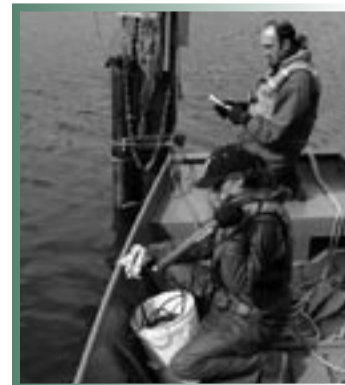
South Slough NERR will seek support and partnerships to further investigate the sources and dynamics of bacteria in the tidal waters of the estuary. Additional research efforts will use microbial source tracking techniques to identify the specific sources of bacteria in the vicinity of Charleston (i.e., recreational and industrial marina, residential developments, shoreline seafood processing plants, and sewage treatment plant outfalls). Expansion of the estuarine monitoring and assessment program will include most-probable-number estimates for *Enterococcus* in tidal waters. This project will also provide the Reserve with the opportunity to incorporate water quality data in the development of a hydrodynamic model. The model will use movement of bacteria and other parameters to determine water circulation patterns throughout the South Slough.

Monitoring

During this planning period, South Slough NERR will continue to engage in monitoring activities that provide baseline data over extended periods of time, describe trends in ecosystem dynamics, and provide information about project effectiveness. Local monitoring will include collaborating with partners to monitor levels of bacteria in the estuary and to examine levels of bacterial contamination in relation to seasonal storm events. The Reserve will also work with local partners proactively to address water quality concerns prior to implementation of TMDL standards for the watershed.

System-Wide Monitoring Program

South Slough NERR will continue to implement Phase 1 of the SWMP and will incorporate elements of Phase 2 and Phase 3 as they are developed and recommended by the NERRS.



Monitoring water quality

Phase 1. Estuarine Water Quality, Coastal Weather, and Dissolved Nutrients

The Reserve will continue to collect digital datasets that describe short-term changes and long-term trends among estuarine water quality parameters, dissolved nutrients, and coastal weather. Time-series datasets will be used to address the hypothesis that nutrient dynamics within the South Slough estuary are driven primarily by oceanic forcing during the spring and summer seasons, and by watershed inputs during the rainy season. Preliminary analysis of the time-series data confirms that the availability of nitrate and ammonium is greatest during periods of upwelling in the marine-dominated and mesohaline region of the estuary, and that nutrient concentrations decline in the riverine region of the South Slough. Advancements in this ambient monitoring program will include acquisition of real time data and the integration of multiple data sets from different instrument arrays.

Phase 2. Biotic Monitoring of Estuarine Habitats and Communities

South Slough NERR is serving as a pilot project site to develop and test protocols for system-wide monitoring of salt marshes and submerged aquatic vegetation. If successful, these protocols will be implemented on a system-wide basis, including South Slough.

Phase 3. Land Use and Habitat Change

A pilot project to develop a NERRS-wide protocol to assess land use and land cover is being tested at selected reserves. The project is evaluating a variety of remote sensing technologies to determine the scale and resolution needed to assess and monitor changes in wetland and upland habitats throughout the NERR system.

Integrated Ocean Observing System (IOOS)

South Slough NERR will serve as a partner in the development of the Northwest regional coastal component of the Integrated Ocean Observing System (IOOS). The IOOS is envisioned as national network of data acquisition and dissemination sites that will provide information about the status and condition of the nation's estuaries and coastal waters. Information gathered by the Reserve will be used to further develop and validate numerical models that link ecosystem processes within the South Slough and Coos estuary and the nearshore Pacific Ocean.

Action Plan for Research

Goal 1. Conduct and coordinate scientific research that increases understanding of ecological dynamics in the South Slough, Coos, and other Pacific Northwest estuaries.

Objective 1a. Conduct a program of fundamental and applied ecological research that focuses on increased understanding of the South Slough and Coos Estuary.

Task

- Submit research proposals, solicit financial support, and conduct scientific investigations that address themes and priority topics for research in the South Slough NERR and the adjacent estuarine tidal basin (see Figure 4.2: South Slough NERR Research Themes).
- Participate in annual scientific meetings, seminars, and professional workshops to keep abreast of national and regional research problems, current coastal management issues, and opportunities for partnerships and collaboration.
- Establish a South Slough NERR Research Advisory Panel to serve as a forum for discussion of research program issues and establish priorities for future research.
- Maintain laboratory facilities and equipment at the South Slough NERR Estuarine and Coastal Science Laboratory.
- Conduct fundamental and applied investigations in the South Slough, Coos Bay, or other appropriate locations to address pressing estuarine and coastal management issues that are widely applicable throughout the Lower Columbia biogeographic province.



Research in soft-sediment habitats

Objective 1b. Encourage and coordinate research by outside investigators by providing opportunities for university faculty, students, agency investigators, and others to conduct research projects that address priority estuarine science and coastal management issues.

Task

- Encourage and facilitate use of the South Slough NERR as a location for scientific research by university faculty, graduate students, undergraduate students, agency investigators, private industry, and volunteers.
- Assist NERR Graduate Research Fellows, outside investigators, and visiting researchers with implementation of field and laboratory work conducted in the South Slough and Coos estuary.
- Develop, maintain, and distribute a Web-based description of research opportunities at the South Slough NERR, including links to other estuarine research programs.
- Collaborate with the local, regional, and national estuarine research community to encourage development of new proposals for scientific research.
- Provide outside investigators with access to South Slough NERR technical reports, the site profile of the South Slough estuary, and other relevant materials that may assist with development of research projects.
- Maintain and make available a description of state matching funds that may be used as non-federal contributions to research proposals.

Goal 2. Assess and monitor the status of estuarine habitats and biotic indicators to track short-term variability and long-term changes in estuarine habitats and communities.

Objective 2a. Use the South Slough NERR as a natural laboratory or benchmark to assess the magnitude and extent of change in the Coos estuary and other estuarine ecosystems located throughout the Lower Columbia biogeographic province.

Task

- Develop a framework for routine assessment of ecological indicators and environmental stressors that will provide quantitative measures of ecological conditions in the South Slough estuary.
- Provide high quality, continuous monitoring data for estuarine water quality parameters and local weather conditions.
- Monitor the annual status and condition of eelgrass beds and submerged aquatic vegetation as biotic indicators of ecosystem conditions.
- Develop and implement a protocol to monitor the status and extent of aquatic non-indigenous species in the South Slough and Coos estuaries.
- Acquire, verify, and ground-truth remotely sensed spatial data in order to develop detailed baseline habitat maps of the intertidal and subtidal regions of the South Slough estuary.
- Develop GIS data layer for the Coos estuary that conforms to the national habitat classification.



Researching the effects of oysters on eelgrass

Goal 3. Provide technical assistance and advisory services that contribute to efficient and effective management of estuaries in the Lower Columbia biogeographic province.

Objective 3a. Encourage and assist in the development of an interdisciplinary, science-based, multi-agency approach to coordinated research and ecosystem management in the Coos estuary and other estuarine systems.

Task

- Convene a series of workshops to discuss and summarize the status of existing knowledge about the ecology of the Coos estuary, and to review and revise local priorities for future research, monitoring, and ecosystem modeling (*see Figure 4.3: Research Priorities 2006-2011*).
- Assist with coordination and facilitation of cooperative research activities among academic institutions, and local, state, and national resource agencies that conduct ecological research and monitoring in estuaries and nearshore regions of Oregon and northern California.
- Participate on scientific task forces and advisory groups that work to develop, conduct, and oversee specific research projects that contribute to improved technical understanding and management of Oregon's estuarine and nearshore ecosystems.

Objective 3b. Disseminate and promote the use of technical research information as a basis for more informed coastal management decisions throughout the estuaries and nearshore regions of the Lower Columbia biogeographic province.

Task

- Participate in conferences, and professional workshops, and deliver seminars to promote a wider understanding of estuarine science issues and resource management problems.
- Publish and distribute technical reports, manuscripts, Web-based, and other media that will serve to inform a target audience about the results and implications of estuarine research.
- Provide technical assistance on marine and estuarine science and management issues to ports, harbor districts, state and county planning agencies, non-governmental organizations, and other groups.

5

Education

South Slough National Estuarine Research Reserve
Management Plan



Chapter 5: Education

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Education



APRIL 2006

The Education Program at South Slough National Estuarine Research Reserve (South Slough NERR) is built on the belief that when people are aware of the functions and values of estuaries, they are motivated to support the management and protection of these habitats. The Education Program offers a variety of educational and interpretive activities, exhibits, and information that provide opportunities to experience and learn about

estuaries and the Reserve. The program is focused on promoting a greater understanding and appreciation for estuarine ecosystems and improved coastal stewardship.



Students in the field

During this planning period, the Education Program will take advantage of expanded interpretive facilities at the Reserve and will develop strategies for increased visitation and program participation. Efforts will be focused on updating and enhancing offerings for K-12 audiences, professional teacher development, developing new interpretive exhibits, revising informational materials, and increasing community participation.

The South Slough NERR education program will seek to incorporate the following **key themes** into educational programming and training activities, so that participants have a better understanding of the research occurring at the Reserve and support improved stewardship of estuarine resources.

- **Estuarine ecology** encompasses a complex system of relationships between living and non-living elements connecting the watershed to the ocean through tidal marshes, channels, tidflats, and rocky shores.
- **Protection and improvement of conditions within the watershed and the waters of the estuary** can help to support a sustainable estuarine ecosystem.

- Study of **land use and habitat change** support improved understanding of the estuarine ecosystem and the activities necessary to restore these functions.
- Through **habitat restoration**, the condition of the watershed and the estuary can be improved to better sustain the ecosystem.
- **Invasive species** may pose significant threats to the stability and integrity of the estuarine ecosystem.

Goals

The goals for the South Slough NERR Education Program are to:

- Goal 1. Expand awareness about coastal environments and the South Slough NERR to enhance interest in the educational programs and resources offered by the Reserve.
- Goal 2. Provide a variety of high-quality educational experiences to facilitate understand of key themes within Pacific Northwest estuaries and coastal watersheds.
- Goal 3. Develop a broader understanding about the purpose of South Slough NERR and the importance of using science results to inform coastal decision making and take responsible action.

Background

The National Estuarine Research Reserve System (NERRS) was created in 1972, as part of the Coastal Zone Management Act (CZMA), to increase our ability to responsibly manage estuarine ecosystems. A critical aspect of this mandate for the NERRS is the education, interpretation, and outreach component. In part, a reserve must:

"...serve to enhance public awareness and understanding of estuarine areas, and provide suitable opportunities for public education and interpretation."

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Marsh studies



Oil spill damage assesment training

The Education Program at South Slough NERR began in the late 1970's with an emphasis on providing structured on-site activities for students and teachers, interpretive displays and information about general estuarine themes, and opportunities for the public to learn about and experience estuaries. During the past two decades, the program has increased its emphasis on the Lower Columbia biogeographic province and evolved to address issues of local, regional, and national relevance. Expanded interpretive facilities, new trails, technological advances, national education initiatives, partnerships, and additional staff have enabled the Reserve to reach new audiences with a larger scope of educational offerings.

NERRS Education Initiatives

Within the NERRS, each reserve is responsible for developing and implementing a program that links education to scientific research and stewardship. Although the education programs at each reserve function independently in response to local and regional needs, the NERRS has developed system-wide education initiatives in which individual reserves participate. Current national education initiatives are described below.

Coastal Training Program

The Coastal Training Program (CTP) emerged as a NERRS education initiative in 2001, evolving from the Coastal Decision-Maker Workshops that became part of the basic operations for all reserves in 1998. The CTP is designed to provide scientific information and skill-building opportunities to coastal decision-makers, facilitate networking and collaborations at local and bioregional levels, and increase understanding of the consequences of human activities within the coastal landscape.

The CTP uses a variety of formats including seminars, hands-on skills training, participatory workshops, and technology demonstrations. Partnerships are essential to the CTP and programming is coordinated with the efforts of state coastal management and Sea Grant programs, along with local and regional agencies and organizations.

Coastal Decision-Maker

An individual who makes decisions about coastal resources on a regular basis in a professional or volunteer capacity.

Based on the results of a market analysis and input from a Coastal Training Program Advisory Group, the CTP at South Slough NERR will focus efforts on the following key training issues:

- Watershed habitat restoration
- Water quality protection
- Invasive species management
- Managing visitor impacts on natural and cultural resources
- Marine protected areas
- Coastal hazard preparedness

Estuary Live

Estuary Live is a national event coordinated by the NERRS and Environmental Protection Agency's (EPA's) National Estuary Program. Since 1998, Estuary Live has delivered real-time broadcasts of field experiences from selected NERRS sites to classrooms throughout the globe using Internet streaming technology. This two-day event is scheduled annually in September to coincide with National Estuaries Day.

Inventory and Assessment of K-12 and Teacher Development Programs

In 2002, the NERRS conducted a system-wide inventory and assessment of K-12 programming and professional teacher development activities throughout the reserves. This study also examined how reserve education programs integrate state and national standards. The assessment identified a need for funding to increase capacity and for system-wide enhancement of K-12 education and professional teacher development.



Estuary Live



Investigating estuarine animals

Overview of Education at South Slough NERR

The Education Program at South Slough NERR addresses diverse audiences and strives to provide activities that appeal to a range of interests, ages, and backgrounds. Audiences served by the Reserve’s education and interpretive programming can be categorized as academic, professional, and the public. Academic audiences include students and participants from traditional and non-traditional education settings, ranging from pre-schools to Elderhostel groups. Professional audiences include members of community organizations, service clubs, chambers of commerce, and educators, along with coastal decision-makers. The public audience includes people who visit the Interpretive Center and trails at the Reserve, as well as those who attend off-site exhibits and events in which the Reserve participates.

South Slough NERR provides school-based education programs and implements national education initiatives developed by the NERRS on a local and regional scale. The Reserve also organizes seasonal calendars of events and offers a variety of public programs, including guided hikes and paddling trips, a winter lecture series, lunchtime seminars, volunteer training opportunities, children’s activities, and hands-on learning experiences. Additionally, the Education Program coordinates the development of interpretive materials, exhibits, and trails for the Reserve.

The following curricula and education initiatives provide the foundation for education programming at the Reserve.

Estuary Study Program

The Estuary Study Program offers field study opportunities for students in grades K-12 visiting South Slough NERR. The program, is comprised of 4 levels of curricula (*see Figure 5.1*), teacher training, and reading guides. The Estuary Study Program will be revised and updated during this planning period.

Figure 5.1: Components of the Estuary Study Program

Level	Title	Recommended grades
1	In Search of the Treasures of South Slough	4th & 5th
2	The Secret of the Lost Medallion	6th
3	The Lore of South Slough	7th & 8th
4	Estuary: An Ecosystem and a Resource	9th – 12th

International Brant Monitoring Project

The International Brant Monitoring Project was developed in 1996 as a partnership between NOAA, the U.S. Fish and Wildlife Service, Padilla Bay NERR, South Slough NERR, the Pro Esteros Project of Mexico, and schools along the Pacific flyway. The project curriculum teaches students about migration and coastal resources. In Oregon, the project has been implemented mainly by schools located near the Reserve.

Marine Activities and Resource Education

The Marine Activities and Resource Education (MARE) program is a model for marine education, developed by the Lawrence Hall of Science at the University of California, Berkeley. Through teacher training and the development of leadership teams, K-8 students study a different marine environment each year using an interdisciplinary, inquiry-based curriculum. The program has recently been introduced in the Coos Bay and North Bend School Districts and is being offered to other local districts.

Apprenticeships in Science and Engineering

South Slough NERR has been a host site for students in the Apprenticeships in Science and Engineering (ASE) program since 1992. Through two-month internships, high school students participate in science-based projects that support the education, research, and stewardship efforts of the Reserve. The program provides school-to-work activities endorsed by the education standards for the State of Oregon.

Coastal Environments Learning Network

The Coastal Environments Learning Network (CELN) is an initiative to provide educational materials and programs that highlight the diversity of coastal habitats found in southwestern Oregon through a system of natural areas. As a member of the Oregon Coastal Environments Awareness Network (OCEAN), a collaboration of natural resource agencies, organizations, and educators that is leading efforts to develop the CELN, South Slough NERR has been involved in the development of this initiative over the last decade (*see Appendix F*).



Student field research apprenticeship



Partnerships

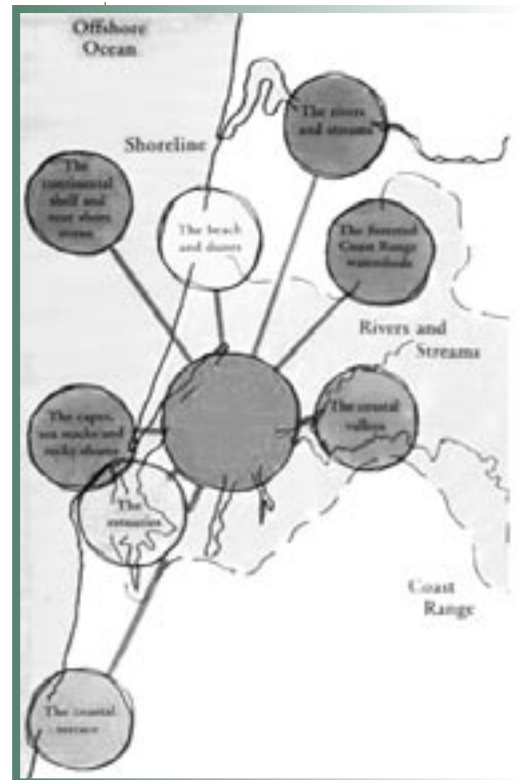
While the Reserve's trails and Interpretive Center provide the context for many education activities, the focus and efforts of the Education Program extend beyond the Reserve boundaries. Relationships with a variety of partners have allowed South Slough NERR to participate in and develop new education initiative and to reach wider audiences (*see Appendices E and F*). All program areas at the Reserve are involved to some extent in education and outreach efforts.

Accomplishments 1994-2005

The major accomplishments of the South Slough NERR Education Program over the past planning period reflect the cooperative efforts of staff and partners to develop and implement innovative and relevant education programming that addresses the needs of diverse audiences.

- Delivered over 680 site-based programs for approximately 25,660 students throughout Oregon since 1994.
- Collaborated with the Oregon Institute of Marine Biology (OIMB) and OCEAN to establish the Marine Activities and Resource Education curriculum in the Coos Bay and North Bend School Districts.
- Implemented the Estuary Net project from 1995-2000. Provided teacher training and technical assistance for water quality monitoring to 31 high schools and middle schools along the Oregon and northern California coast in partnership with Coast Net, a program administered by Oregon State University Extension Sea Grant.
- Led the development of the International Brant Monitoring Project. Developed curriculum and coordinated school participation in Alaska, British Columbia, Washington, Oregon, and Mexico to teach students about the migration of the Brant goose through field observations and Internet activities.
- Participated in Estuary Live since 2001. Collaborated with Tillamook Bay National Estuary Program, OIMB, natural resource professionals, and local teachers and students to broadcast field experiences from the South Slough estuary.
- Hosted 21 high school students in eight-week summer internships through the Apprenticeships in Science and Engineering program since 1994.

- Increased the number and diversity of interpretive programs to address a range of audiences and extended the hours of the Interpretive Center to include Saturdays throughout the year.
- Hosted 26 coastal decision-maker workshops which provided information and training to 813 participants.
- Completed a market analysis of the training opportunities available to coastal decision-makers in the Lower Columbia biogeographic province, identified target audiences and key coastal management issues for which training in the region is lacking, completed a needs assessment of watershed councils in Oregon with respect to habitat restoration, and developed a program strategy and marketing plan for the Coastal Training Program at South Slough NERR.
- Produced six estuarine management issue papers since 1997 on the following topics:
 - Flooding on the Oregon Coast
 - Native Shellfish and Introduced Species
 - Pacific Northwest Salt Marshes
 - Salmon and Trout in Estuaries
 - Nonpoint-source Pollution and Pacific Northwest Estuaries
 - Returning the Tides to Pacific Northwest Estuaries
- Developed a South Slough NERR website to provide information about programs and events at the Reserve.
- Expanded efforts to train and incorporate volunteers in the development and delivery of education programs at the Reserve.
- Led efforts to develop the Coastal Environments Learning Network (CELN) in partnership with OCEAN. Coordinated the development of a feasibility study and interpretive plan and participated in program and exhibit design.



CELN Schematic

Needs

Over the course of this management plan, South Slough NERR will focus efforts on addressing the following education needs.

On-site Curriculum

The Estuary Study Program was developed between 1982 and 1984 and serves as the primary on-site program offering for 3rd through 6th grade students. With the majority of site visits to the Reserve made by elementary school classes, this program is still requested. The curriculum, however, is now 20 years old and should be revised to incorporate the latest education methodology and to address statewide education standards. South Slough NERR needs to convene an Education Advisory Group to provide guidance for the curricula development.



Restoration study at Dalton Creek marsh

Methods to Engage Middle and High School Audiences

Students in grades 8 through 12 are less frequent participants in the Reserve's site-based education programs and are typically served by custom programs developed with input from the teacher making the request. Middle and high school classes often request classroom and field-based activities away from the Reserve. South Slough NERR needs to establish methods to engage middle and high school audiences in a consistent manner.

Evaluation of Program Offerings

As the requests for education programs at the Reserve have increased, so has the demand for customized activities. Custom programs are more costly to deliver compared to established programs due to the increased preparation time involved, and thus limit the staff's capacity to accommodate education program requests. The number and types of education programs being requested need to be evaluated and future demand projected in order to determine the focus of education programs that should be developed and offered.

School-to-Work Educational Experiences

Beginning in the late 1980s, South Slough NERR provided internships for individuals seeking educational, pre-professional work experiences. By 1996, these internships were either replaced with limited-duration positions or discontinued as funding was shifted, and the opportunities provided by these internships have not been effectively replaced. The Reserve needs to develop opportunities that will provide school-to-work educational experiences.

Updated Information for Visitors

With the completion of renovations to the Interpretive Center, development of new trails, expansion of public program offerings, and further development of education programs, the Reserve needs updated exhibits, brochures, and promotional materials. The current exhibits and majority of the brochures were produced in the 1980s. The Reserve's website developed in 1997, has been recently updated to provide a user-friendly format used by all Oregon state agencies. These resources are important tools for promoting an understanding of estuaries and coastal watersheds, increasing visitation and program participation, and providing the public with information about research, stewardship and education programs and activities at South Slough NERR.



South Slough trail

Interpretive Planning

Development of interpretive facilities, trails, and exhibits at South Slough NERR has primarily been focused on the Interpretive Center and areas of the Reserve accessible from the main entrance. Existing plans (*1994 Management Plan*, the *South Slough NERR Facilities Master Plan*, and the *South Slough Watershed Walkway plan*) provided guidance for these efforts; however the Reserve has not employed a coordinated approach to interpretive planning.

Most of the interpretive elements planned thus far for the Reserve are in various stages of design, construction, or completion, but development of the south end of the Reserve has not yet been planned. Interpretive planning at the South Slough NERR needs to focus on developing facilities and unifying themes for the south

end of the Reserve. The Reserve also needs strategies for using new technologies and for maximizing the usefulness of exhibits and other communication tools such as websites, published materials, and printed brochures.

Information for Coastal Decision-makers

South Slough NERR is committed to addressing the information needs of the coastal management community. The Reserve needs to be more responsive to the local and regional demand for science-based information and tools that will contribute to the vitality of coastal ecosystems and coastal communities.

Increased Program Participation

The mission of South Slough NERR can be more readily attained through increased participation in the Reserve's programs. This can be accomplished through a combination of new programs and activities, more opportunities for public involvement, partnerships, and increased efforts to promote education and interpretive programs at South Slough NERR.

Education Program 2006-2011

The South Slough NERR Education Program strives to meet the needs of a variety of audiences through on-site and off-site programs, some of which are highly structured and others that are more interpretive. With the recent completion of a classroom and expanded interpretive facilities at South Slough NERR, the Education Program will focus its efforts on developing new offerings that complement and improve existing programs and are designed to meet the needs of the Reserve's audiences.

Academic Program Development

The Education Program will continue to offer on-site and off-site education programs for K-12 audiences through established curricula, custom programs, and national initiatives. The Reserve will focus on establishing directed education activities and support materials that address state education standards and accommodate school budgets and schedules. A transition from extensive use of customized programs to a series of carefully developed learning kits and pre-determined methods of delivery



Making "estuary soup"



Coastal study

will allow the Reserve's K-12 education programming to more effectively and efficiently meet educators' needs.

Estuary Study Program

With assistance from an Education Advisory Group, the Reserve will evaluate the Estuary Study Program curriculum to determine if the program meets current K-12 education needs and how the curriculum can be revised to accommodate Oregon education standards and modern educational theory. The Education Program will also explore other options for meeting the demand for an on-site curricula for the Reserve.

International Brant Monitoring Project

The Reserve will continue to participate in the International Brant Monitoring Project. Because the program can be best supported by working with classroom teachers, the Reserve will use professional teacher development as a means to disseminate the existing curriculum and expand involvement by Oregon schools.

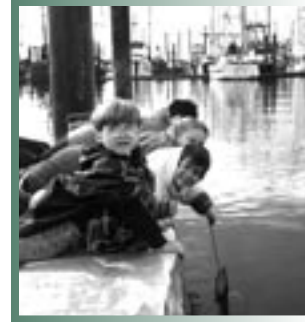
Marine Activities and Resource Education (MARE)

South Slough NERR will continue to participate in the MARE program and will provide relevant teacher development experiences using the resources of the Reserve. The program is attracting interest throughout the region and the Reserve is participating in the development of a MARE training institute for educators throughout the Pacific Northwest.

The MARE program has been introduced into Coos Bay area School Districts and the Reserve is receiving requests from educators to incorporate MARE activities into student programs at the Reserve. The Education Program will support the use of the Reserve for implementation of MARE program activities.

Custom Programs

The Education Program will develop an assortment of learning modules in order to more efficiently meet the demand for customized education programs. Modules will focus on a variety of estuarine and coastal watershed topics and will be developed for a range of grades. These education activities will be made available as kits that can be delivered by Reserve staff, educators, or trained volunteers, and will be



*Discovering estuary life
under the docks*



Tideflat exploration



Tideflat study during Summer Science Camp

Internships at South Slough NERR will

- *Provide structured work experiences that meet minimum criteria and involve specific occupational skills development and education goals.*
- *Offer students an option to earn academic credit upon successful completion.*
- *Include the expectation that the intern, upon completion of the internship, will have had an opportunity to acquire and use skills necessary for employment in the occupational area of the internship.*

organized to provide educators with flexibility and choices for on-site programs. The modules will encourage repeat visits to the Reserve by offering a variety of education program options.

Estuary Live

South Slough NERR will continue to participate in the Estuary Live project and serve as a host site. Estuary Live provides an opportunity for educators to incorporate estuarine themes and content into their curriculum and is a virtual field trip alternative for classes that are unable to travel to the coast. The project will play an important role in the Reserve's efforts to reach a broader state-wide

audience of students and educators. The Education Program will focus efforts on marketing the project to Oregon schools to increase involvement at the state level.

Summer Science Camp

The Education Program will work with the Education Advisory Committee to determine the feasibility of developing a summer science camp at South Slough NERR. Based on goals and objectives similar to those of the ASE program, a summer science camp will have the potential to host a larger group of students than can be accommodated through ASE. While the Reserve will continue to participate in ASE, a summer science camp will provide another option for high school students interested in participating in science activities.

Internships

The Education Program will initiate an internship program to provide limited-duration career development experiences delivering interpretive and education programs. The Reserve will develop the internship program to meet the objectives of Oregon's School-to-Work Career Related Learning Program.

Professional Development Opportunities for Educators

Training opportunities for professional educators emphasizing estuarine themes and topics of importance to South Slough NERR are an effective means of reaching K-12 students. The Education Program will promote South Slough NERR as a location for teacher training activities, using curricula and resources developed by the Reserve as well as through collaborative efforts.

The results of the inventory and assessment of K-12 and teacher development programs conducted by the NERRS will be used in conjunction with the Education Advisory Group to inform planning for professional teacher training opportunities at the Reserve. The Coastal Environments Learning Network and the MARE program are potential delivery mechanisms for teacher professional development and will continue to be priority projects for the Education Program.

Coastal Training Program

The Education Program will continue to support the development and implementation of the Coastal Training Program at South Slough NERR. With an emphasis on habitat restoration, water quality protection, and invasive species management (three of the six issues identified as priorities), the CTP will focus on the following during this planning period:

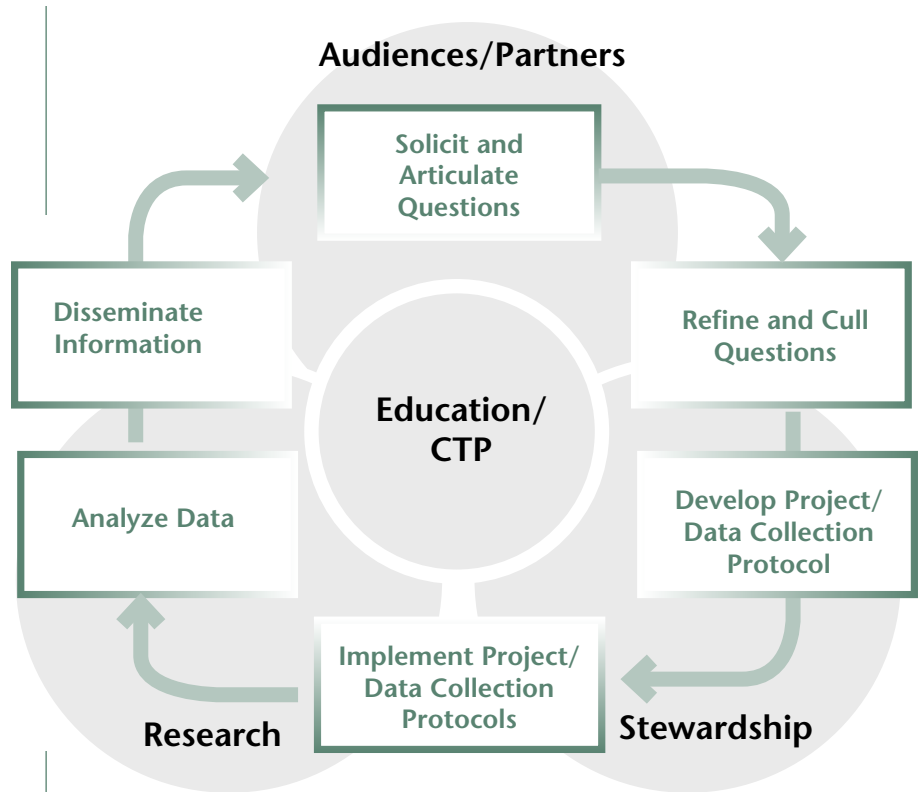
- Identify the needs of coastal decision-makers.
- Conduct training workshops for coastal decision-makers.
- Test and adapt an Inquiry-Based Information Services model to identify information gaps and develop demonstration projects.
- Conduct evaluations (i.e., follow-up surveys) to measure the effectiveness of CTP training and outreach.
- Develop Internet-based training and information for decision makers.

The Inquiry-Based Information Services (IBIS) will be tested in cooperation with the Stewardship Program at the Reserve in order to encourage public and stakeholder participation in the development of training products and demonstration projects (*see Stewardship chapter, page 6-1*). Using IBIS, CTP staff will solicit decision makers' questions using techniques such as needs assessments, focus groups, and personal contacts. The CTP will then collaborate with Reserve staff to refine those questions and the Stewardship Program will work with stakeholders, partners, and advisors to collect and analyze data as part of demonstration projects. Following analyses, CTP staff will disseminate the information. The IBIS cycle is completed when decision-maker audiences and partners return with a new series of questions related to the topic. (*See Figure 5.2*).

CTP Priorities

- *Habitat Restoration*
- *Water Quality Protection*
- *Invasive Species Management*
- *Marine Protected Areas*
- *Visitor Impacts*
- *Coastal Hazards Preparedness*

Figure 5.2
Inquiry-Based Information
Services



Training Opportunities for Volunteers

South Slough NERR will expand opportunities for public involvement by developing a volunteer orientation and training program. Such a program will ensure that volunteers receive information about the history, environments, operation, and policies of the Reserve and that they are provided with training and information specific to their volunteer positions.



South Slough puppet show

Public Programs

The Reserve will continue to provide diverse activities for the public such as guided hikes, paddling tours, hands-on workshops, topical lectures, and special events throughout the year. The Education Program will also participate in community events, such as the Charleston Seafood Festival and the Tsalila Festival. Public programs will be evaluated periodically to determine the need for new activities based on the expressed interests of participants.

Interpretive Exhibits

The Reserve is currently working to construct exhibits for the Interpretive Center and adjacent environments. New exhibits will reveal the environment and unique features of the South Slough, providing an experience that encourages exploration, investigation, and understanding.

Exhibits and interpretive trails at South Slough NERR are designed to work as a system, offering visitors a variety of options for experiencing the Reserve. Trail development is guided by the existing South Slough Watershed Walkway plan and will be further addressed by revisions to the Facilities Master Plan. The interpretive exhibits and trails will be updated to include information from the research, stewardship and monitoring programs.

Communicating information about the cultural heritage of the South Slough is an extremely important element of the Reserve's education and interpretation programming. This information provides context for visitors since much of the South Slough story is woven into the local history. New exhibits at the Reserve will demonstrate the connection between the natural and cultural history of the South Slough area.



Estuary system

Interpretive Planning

The south end of the Reserve is accessible by road but is relatively undeveloped. This area will be a focus for future interpretive planning. The Education Program will participate in the revision of the South Slough NERR Facilities Master Plan to design future trails and structures for this area. Interpretive programming for this portion of the reserve will be developed in close coordination with the stewardship, research and administrative programs at the Reserve.

Interpretive objectives for the south end of South Slough NERR include providing visitors with opportunities to:

- Explore the rich cultural history of the area and learn about changes in the landscape and waterways.
- Gain an appreciation for the natural history of the area through land and water-based trails.
- Learn how science is being used to improve our understanding of estuaries.
- Learn about habitat restoration projects in the area.
- Learn how public access can be accommodated using sustainable design and construction methods.

Website Development

The Education Program will work with DSL to improve the Reserve's website. The Reserve website will be redesigned to be user-friendly, consistent with state guidelines for agency websites, and will be updated regularly. The Reserve will also coordinate with NOAA to ensure that the NERRS web pages for South Slough NERR are complete and current.

The South Slough NERR website is an easy and effective means of distributing information about estuaries and the Reserve. The Education Program will further develop the Reserve's website to provide a library of informational resources.

Brochures and Publications

The Education Program will develop new brochures to replace outdated materials that are currently used to provide an overview of South Slough NERR and as trail and paddling guides. The Reserve will review the need for additional promotional and education publications, including brochures for education and volunteer programs, and will seek support to produce a poster focusing on local and regional coastal resources. The Education Program will collaborate with volunteers and the Friends of South Slough to publish and distribute a quarterly newsletter for the Reserve.

New and revised publications will be designed using a consistent style and format to promote the identity of the Reserve.

Coastal Environments Learning Network

The CELN is designed to serve academic audiences, visitors to the area, as well as interested members of the local community. Themes for the network have been established through an interpretive plan and exhibits have been developed for a hub facility and satellite sites that identify and tie the network together. The Reserve will continue to support and play a lead role in the efforts of the OCEAN to develop and implement the Coastal Environments Learning Network, with an emphasis on the establishment of a hub facility.



Teacher training

Action Plan for Education

Goal 1. Expand awareness about coastal environments and the South Slough NERR to enhance interest in the educational programs and resources offered by the Reserve.



Forest hike

Objective 1.a. Public educational and interpretive programs will increase awareness of the Reserve's mission and activities.

Tasks:

- Identify and deliver programs that incorporate key themes.
- Evaluate programs for effectiveness in meeting specific educational and interpretive objectives.
- Collect key performance indicator data and contribute to long-term data record.
- Analyze performance data annually and use results to inform future program development.
- Prepare and distribute seasonal calendars of events and activities through print and electronic media.

Objective 1.b. Exhibits within the Reserve will emphasize key estuary and coastal watershed themes for visitors.



Low tide reveals a world beneath the mud

Tasks:

- Complete the construction phase for new exhibits at the South Slough NERR Interpretive Center.
- Develop educational and interpretive programming that uses the content of the new exhibits.

Objective 1.c. Develop interpretive strategies in coordination with revisions to the South Slough NERR Facilities Master Plan.

Tasks:

- Identify interpretive strategies that incorporate unifying themes to guide the development of facilities and trails for the south end of the Reserve.
- Improve the interpretive features of the Ten Minute Trail.
- Identify opportunities and implement an initiative to expand water-based educational and interpretive programs.

Objective 1.d. Develop and disseminate information about the Reserve, estuaries, and coastal watersheds.

Tasks:

- Develop new site, trail, and paddling brochures with updated information and maps using a consistent graphics standard.
- Develop and implement a strategy to maintain the newly revised South Slough NERR website with accurate and up-to-date information about programs and activities at the Reserve.
- Develop an online library of multimedia presentations for use by staff on subjects pertinent to the Reserve and coastal management.
- Provide the media with timely and accurate information about the Reserve's programs and activities through press releases, press packets, and interviews.
- Provide accurate information upon request for publication in travel guides, magazines, and on-line publications.



Goal 2. Provide a variety of high-quality educational experiences to facilitate understanding of key themes within Pacific Northwest estuaries and coastal watersheds.

Objective 2.a. Preschool and K-12 audiences will improve their understanding of estuarine ecology and the role that people play in determining ecosystem health.

Tasks:

- Work with teachers to deliver thematically focused programs that meet educational goals and the needs of the students.
 - Provide educational programs on-site and off-site for traditional and non-traditional preschool and k-12 audiences.
-

Objective 2.b. K-12 program offerings will address state and national standards based on assessment of needs and interests of target audiences.

Tasks:

- Establish an Educational Advisory Group to strategically plan and guide the development of education programs for the Reserve.
- Evaluate the effectiveness of k-12 programs on an annual basis and use results to guide program development.
- Conduct an assessment of estuarine and coastal watershed education materials that are available locally, regionally, and nationally to identify gaps and develop strategies for meeting the need for on-site curriculum for the Reserve.

Objective 2.c. The Reserve will engage a broader range of student audiences.

Tasks:

- Continue to participate in the national Estuary Live project with a greater emphasis on effectively promoting the event in Oregon and increasing the participation of Oregon schools.
 - Develop and implement a summer science camp for high school students.
-

Objective 2.d. Students will be provided with school to work opportunities emphasizing science and natural resource management.

Tasks:

- Continue to participate in the Apprenticeships in Science and Engineering program.
 - Initiate an education internship program to provide pre-professional training and skills development.
-

Objective 2.e. Educators will participate in professional development opportunities sponsored by the Reserve.

Tasks:

- Participate in the development and implementation of the MARE training institute for educators.
 - Train educators in the use of curricula and education modules developed by the Reserve.
-

Objective 2.f. Coastal decision-makers will participate in training opportunities and use educational materials offered by the Reserve to improve their understanding of coastal management issues.

Task:

- Deliver high quality, relevant training programs focused on priority topics and issues identified through needs assessment and market analysis work.
(see page 5-3)



Salal in bloom

Goal 3. Develop a broader understanding about the purpose of South Slough NERR and the importance of using scientific results to inform coastal decision making and take responsible actions.

Objective 3.a. Community members use accurate information to become good coastal stewards through environmentally responsible behaviors and actions.

Tasks:

- Identify priority community audiences and determine current levels of knowledge and informational needs.
- Participate in community events and regional initiatives that address identified needs and educate the public about coastal environments and issues.
- Support, promote, and facilitate the development of the Coastal Environments Learning Network (CELN).
- Provide presentations, posters, and displays for local and regional conferences and festivals highlighting responsible coastal stewardship.

Objective 3.b. Educators and students apply knowledge to develop and execute projects that promote environmental stewardship.

Tasks:

- Engage teachers and students in on-site and off-site stewardship projects that promote understanding and awareness of key themes.
- Participate in local, regional, and national organizations that promote and provide coastal resource education to build awareness of the Reserve's educational resources.
- Measure the effectiveness of stewardship projects and evaluate behavioral change in teachers and students.
- Work with teachers and students to expand participation in the International Brant Monitoring Project and apply knowledge gained to stewardship of community natural resources.

Objective 3.c. Coastal decision-makers make more informed decisions concerning key topics identified in CTP strategy.

Tasks:

- Provide opportunities for outreach and collaboration and, where appropriate, training, to coastal decision makers by facilitating workshops, field trips, and training materials such as website presentations and written materials.
- Review and update the CTP strategy to reflect changing coastal management issues and circumstances.
- Conduct needs assessments to better understand coastal management issues and applicability within the CTP strategy.
- Seek and develop partnership opportunities with coastal zone management agencies, non-profit organizations, businesses and individuals.
- Develop web-based opportunities for training and information transfer to assist coastal decision makers in addressing CTP priority topics.
- Represent South Slough Reserve at regional and national levels by participating in NERRS annual and education sector meetings, national and regional conferences (where appropriate) to further the goals and objectives of the Coastal Training Program and NERRS.
- Collaborate with South Slough Reserve Stewardship and Research sectors to meet the informational and training needs of coastal decision makers.



*Freshwater wetlands along
Wasson Creek*

Objective 3.d. Increase opportunities for public involvement in the educational and interpretive programs offered by the Reserve.

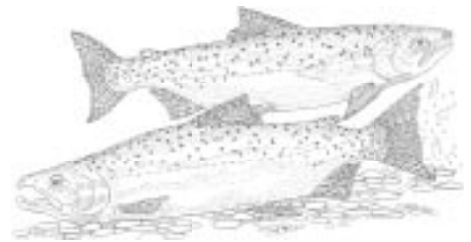
Tasks:

- Coordinate development of volunteer orientation and training materials.
- Train volunteers to assist with education and interpretive program delivery.
- Develop an Estuary Explorers program for 6-14 year olds to promote understanding of key themes, introduce positive stewardship practices and provide recognition for actions.



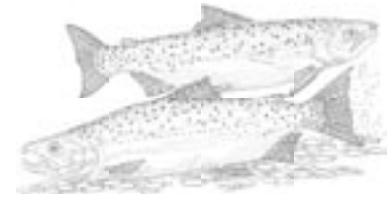
Stewardship

South Slough National Estuarine Research Reserve
Management Plan



Chapter 6: Stewardship

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Stewardship

APRIL 2006

Stewardship is the thoughtful and responsible management of natural resources and associated natural processes for future generations of all species.

The Stewardship Program at South Slough National Estuarine Research Reserve (South Slough NERR) is dedicated to the Reserve's function as a protected area to be used as a focal point for coastal ecosystem research and education. The program operates with input from a variety of partners to maintain the ecological integrity of the Reserve and its associated watershed and to generate science-based natural resource management information that is relevant to the communities and partners served by the Reserve. The intent is to foster better informed management of Pacific Northwest estuaries and coastal watersheds.

To date, the Stewardship Program has been primarily focused on habitat restoration and acquisition planning. The program will grow over the next planning period into a more broadly focused, integrated and innovative example of coastal Pacific Northwest watershed stewardship.

Goals

The goals for the South Slough NERR Stewardship Program are to:

- Goal 1. Manage and restore the habitats and ecosystem processes associated with the South Slough NERR using an adaptive management approach.**
- Goal 2. Provide for a diversity of high quality estuarine and coastal habitats representative of the Lower Columbia biogeographic province.**
- Goal 3. Collaborate with local, regional, and national agencies and organizations to address natural resource management issues affecting estuaries and coastal watersheds.**

Background

The South Slough NERR Stewardship Program was proposed as part of the 1994 Management Plan revision. In response to recommendations from NOAA, the Reserve established a Stewardship Program Coordinator position in 1995 to oversee and implement stewardship functions and policies. The Stewardship Program is responsible for the planning, project management, and monitoring associated with habitat restoration in the Reserve, and for coordinating habitat acquisition planning and watershed monitoring activities.

NERRS Stewardship Initiatives

The National Estuarine Research Reserve System (NERRS) is in the process of developing implementation strategies for a Restoration Science Program (RSP). There are two tracks to the proposed Restoration Science Program:

- Track 1 focuses on the implementation of restoration demonstration projects designed specifically to address pressing restoration issues and information gaps. This strategy is aligned closely with the NERRS Coastal Training Program (CTP).
- Track 2 focuses on the collection and dissemination of long-term data sets from restoration reference sites. This strategy is designed to be integrated with the NERRS System-Wide Monitoring Program (SWMP).

Overview of Stewardship at South Slough NERR

Current Stewardship Program activities consist primarily of planning, seeking funding for, and implementing experimental habitat restoration projects and associated monitoring. The Reserve implemented a series of tidal and non-tidal wetland restoration projects between 1996 and 2003 (see *Figure 6.1*). Monitoring at these restoration sites has been under way since 1995 with a focus on evaluating the results of experimental projects and determining project effectiveness.

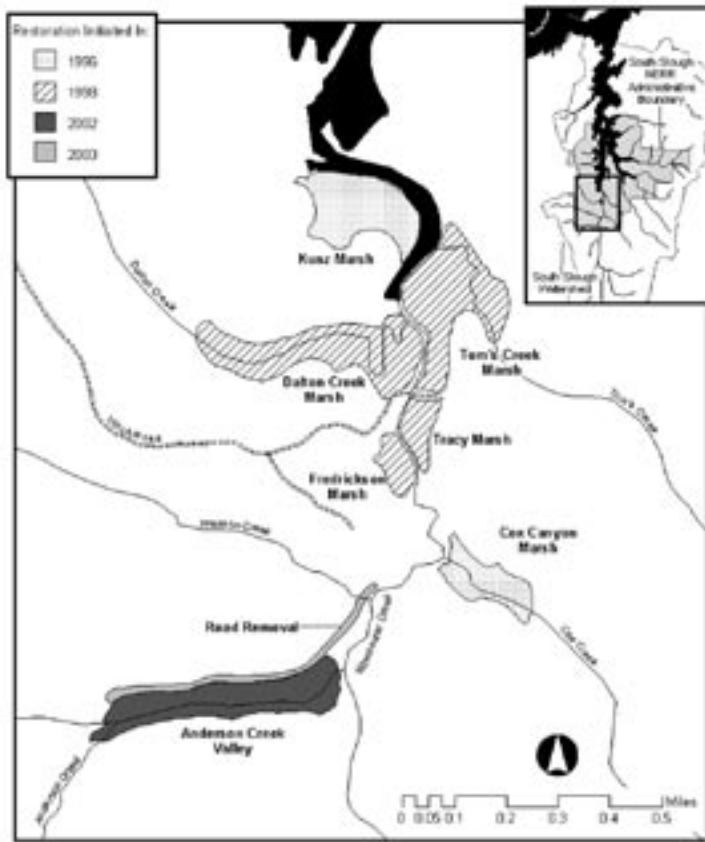
In 1995, South Slough NERR received a donation of \$1.6 million for habitat acquisition from the estate of Chalmer Gustafson. This bequest underscored the need to develop a plan to guide habitat acquisition at the Reserve. Through the formation of a Cooperative Plan Advisory Group (CPAC), the



Coos Head guards the entrance to Coos Bay and South Slough



Figure 6.1: South Slough NERR Restoration Sites



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Reserve worked with input from the community to complete the *South Slough NERR Cooperative Plan for Watershed Conservation* in 1999. Implementation of the plan is a focus area for the Stewardship Program.

Partnerships

Collaborations with a variety of partners have been essential to the success of a range of projects implemented by the Stewardship Program. In addition to planning and funding assistance, partners in the form of grant-supported staff, contractors, students, volunteers and youth work crews provide the labor for many of the activities associated with the restoration and monitoring projects. The Stewardship Program will continue to foster partnerships with interested organizations, academics, and natural resource professionals in its efforts to promote responsible management of estuarine and coastal ecosystems (see *Appendix E*).

Accomplishments 1994-2003

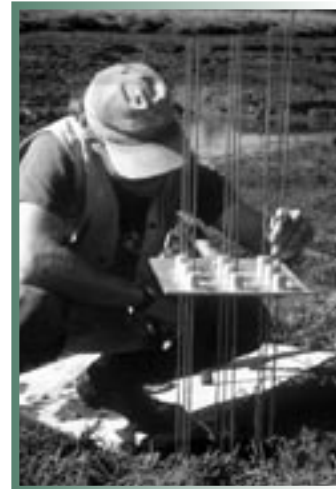
The following summarizes the major accomplishments of the South Slough NERR Stewardship Program over the past planning period. These accomplishments reflect the cooperative efforts of staff and partners to develop and implement projects and activities that maintain the ecological integrity of the Reserve and promote informed management of estuaries and coastal watersheds.



WTRP Advisory Group

- Implemented the Winchester Tidelands Restoration Project (WTRP) between 1993 and 2003.
 - Hosted a series of workshops to plan projects and share information related to estuarine wetland restoration.
 - WTRP Advisory Group workshops in 1993, 1999, 2003
 - Salmon habitat restoration workshop in 2001

- Completed project construction, with assistance from partners, at seven sites in several phases:
 - Kunz and Cox Canyon marshes in 1996
 - Dalton, Fredrickson, Tom's Creek and Tracy marshes in 1998
 - Anderson Creek Marsh in 2002 (creek channel) and 2003 (road removal)
- Monitored habitat restoration sites, in collaboration with partners, since 1995.
 - Monitored the use of estuarine wetland restoration sites by resident and anadromous fish, and life history patterns of juvenile coho salmon in the South Slough.
 - Monitored recovering habitat attributes at Reserve restoration sites.
 - Established the WTRP as a platform for research and restoration monitoring which has included short-term and long-term data collection associated with the NERRS System-Wide Monitoring Program .
 - Graduate research projects conducted in WTRP sites completed on the following topics:
 - Genetic diversity and composition of bacteria in restored and mature wetlands
 - Quantification of the floral and faunal recovery of a restored coastal wetland (Kunz Marsh)
 - Restoration of estuarine wetland habitats within previously diked wetlands in South Slough NERR
- Published two papers on topics integral to the Winchester Tidelands Restoration Project in peer- reviewed journals (*see Appendix G*).
- Received Environmental Hero Awards from NOAA (Stewardship and Research Coordinators) in 2001 in recognition of the estuarine wetland restoration efforts undertaken by South Slough NERR.
- Initiated planning for upland forest management and restoration projects in collaboration with partners.
- Participated in the establishment of a species-specific biocontrol of purple loosestrife, an invasive freshwater wetland species, for the Coos watershed.
- Provided opportunities for volunteers and youth crews to work on projects associated with habitat restoration work at the Reserve.

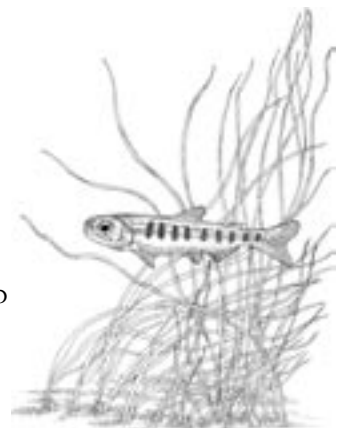


Measuring marsh surface elevation change

- Received the Frank Roberts Awards with the Oregon Youth Conservation Corps crew in 1995 for the outstanding OYCC project of the year.
 - With guidance from representatives of the local community, completed the South Slough NERR Cooperative Plan for Conservation in 1999 to provide direction for Reserve habitat acquisitions.
- Purchased three properties between 1993 and 2002:
 - The Tracy property (1993-1994), a 250 acre parcel comprised of key wetland habitats.
 - Spruce Ranch (1996), a 10 acre parcel to provide visitor housing and adjacent land to develop the Reserve's maintenance facility.
 - The Anderson Creek road (2002), a four-acre parcel to augment the habitat restoration work in the Anderson Creek valley.
- Assisted local, state, and federal partners with activities in response to the grounding of the M.V. New Carissa in 1999.
- Provided leadership to the NERRS for the development of national initiatives related to restoration science, acquisition planning, and invasive species management.
- Facilitated educational and outreach activities related to stewardship activities at South Slough NERR.
 - Instructed (SSNERR Stewardship and Research Coordinator) a coastal wetland restoration course offered biennially during summer session at Oregon Institute of Marine Biology.
 - Coordinated with the Coastal Training Program to host three coastal decision maker workshops for professionals who work in the field of estuarine wetland restoration.
 - Provided technical advice on habitat restoration to students and natural resource professionals.

Needs

The following is a discussion of the processes, systems, and tangibles needed to provide effective stewardship for the Reserve and the South Slough watershed. These needs are not addressed solely by the activities of the





Stewardship Program, but rather by the collective efforts of the Reserve's operations and program areas proposed for the next planning period. Specific operation or program chapters are referenced as necessary.

Systematic Process to Assess Ecological Health of the Reserve

Currently, there is no systematic process for South Slough NERR staff to assess the ecological health of the Reserve. To implement an adaptive management approach to resource management for the Reserve, habitats within the South Slough NERR need to be classified in more detail, the physical boundaries of the area that influences the Reserve need to be defined and environmental indicators need to be defined and monitored. System-wide NERRS programs such as the system wide monitoring program and habitat mapping and change will be integrated into this watershed tracking process.

Resource Management Strategies

Active management is necessary to protect the ecological integrity of the Reserve and its resources. Invasive species, forest fires, Port Orford cedar root rot, changes to hydrology, and activities in the Reserve and its watershed pose threats to the South Slough NERR.

The resources of the Reserve can be more effectively managed with guidance from resource management plans. In particular, a Habitat Restoration Plan that will identify priorities and direction for future restoration efforts. South Slough NERR also needs a plan that defines strategies for effectively preventing, controlling, and eradicating invasive species in the Reserve.

Land Use Planning and Policies for the Reserve

Land uses and activities within the South Slough NERR are currently regulated by the Reserve's Administrative Rules (*see Appendix D*), Stewardship Zones developed in 1984 (*see Appendix H*), and the shoreland and upland zones defined by the Coos County Comprehensive Plan (1983). By tracking various public permit processes, the Reserve also monitors proposed activities in the South Slough watershed that have the potential to affect the ecological integrity of the South Slough NERR.



The current Administrative Rules for the South Slough NERR address visitor uses of the Reserve but do not include rules guiding the activities of the programs and staff on Reserve lands. Sometimes land uses which support one Reserve goal may not always support another. For example, areas in the Reserve free of human impact are necessary to many research and monitoring activities, but the Reserve must also provide public access, parking, and trails for visitors and education activities.

The Reserve needs more detailed land use policies in order to avoid conflicting uses within the Reserve. Additionally, a process is needed to communicate the potential impacts of existing and planned human activities on the integrity of the Reserve in a non-confrontational manner and to work collaboratively with watershed landowners and stakeholders to find solutions.

Implementation of the South Slough NERR Cooperative Plan for Watershed Conservation

The Reserve received a bequest of \$1.6 million in 1995 earmarked for land acquisition, and completed an acquisition plan in 1999 (*South Slough NERR Cooperative Plan for Watershed Conservation*). This donation has been left largely unspent for the past nine years due to the lack of approvals required by the state in order to implement this plan. With the support of its state partner, the Oregon Department of State Lands (DSL), the Reserve needs to focus efforts on implementation of the *South Slough NERR Cooperative Plan for Watershed Conservation* during this planning period (see *Appendix D*).



Kunz marsh restoration project

Reserve Trail System Planning

The current trail master plan (*South Slough Watershed Walkway*) was completed in 1990 and provided guidance for the development of trails that provide access to the northwest portion of the Reserve adjacent to the Interpretive Center. With these trails nearing completion, an updated trail plan is needed in order to identify and address stewardship issues associated with new trail development. In particular, restoration projects in the south end of the Reserve have resulted in large scale changes that



affect access and provide new opportunities for education and interpretation. A new trail master plan, which could possibly be developed as part of the revised *Facilities Master Plan*, will guide the development of a trail system that accommodates visitation and education programs without compromising stewardship goals for the Reserve (*see Facilities & Public Access chapter, page 8-14*).

Operational Geographic Information System

A Geographic Information System (GIS) is a necessary tool for the mapping and spatial analysis demands associated with a wide variety of stewardship projects at South Slough NERR. Through the Protected Area GIS program (PAGIS), the NERRS and NOAA's Coastal Services Center has equipped the Reserve with state-of-the-art hardware, software, and GIS training over the past 10 years. The current complexity of GIS, however, and time commitment associated with learning to use it, precludes its optimal use by Reserve staff. The Reserve's need for GIS capabilities will be best met by the addition of trained staff dedicated to GIS.

Improved Restoration Monitoring Capacity

Ongoing restoration monitoring associated with the Winchester Tidelands Restoration Project has and will continue to generate important information relevant to the recovery of estuarine wetlands, the utility of various restoration techniques, and the life history patterns of juvenile salmon in estuaries. In addition, the value of restoration monitoring data increases as multiple long-term datasets are built over time. With the implementation of new restoration projects, the scale and complexity of the restoration monitoring efforts at the South Slough NERR will increase dramatically. In order to meet the demands associated with the long-term monitoring of multiple restoration projects and improve our ability to contribute to regional and national projects, the Stewardship Program needs a permanent restoration monitoring position.

Community Involvement in Coastal Stewardship

Watershed stewardship is largely dependent on the interest and involvement of citizens who live in the watershed. In order to maintain the ecological integrity of the watershed, the Reserve



needs to increase efforts to engage the local community. A Watershed Stewards program is proposed for this planning period to improve awareness of stewardship issues in the South Slough and Coos watersheds.

Stewardship Program 2006-2011

The Stewardship Program at South Slough NERR is focused on maintaining the ecological integrity of the Reserve and promoting responsible management of coastal ecosystems. Building on a history of habitat restoration, restoration monitoring, and acquisition planning, the Reserve will pursue broader and more integrative methods for watershed stewardship during this planning period.

The Framework for Watershed Stewardship

Responding to the need for a process to assess the ecological integrity for the South Slough watershed, the Stewardship Program at South Slough NERR will test an adaptive management approach referred to as the Framework for Watershed Stewardship Framework (Framework) (*see Figure 6.2*).

Through the Framework, the Reserve will work with the local community and stakeholders to define both existing and desired ecological conditions in the South Slough watershed, identify science-based environmental indicators to monitor those conditions, and implement a suite of management actions that can be used to address issues that may affect the health of the South Slough watershed (*Figure 6.3*). The Framework is intended to provide a non-confrontational process by which the South Slough NERR Management Commission, staff, and South Slough watershed residents and stakeholders can collectively address the Reserve's obligation to protect designated lands from large-scale, chronic, and/or long-term threats to order to maintain the integrity of the ecosystem.

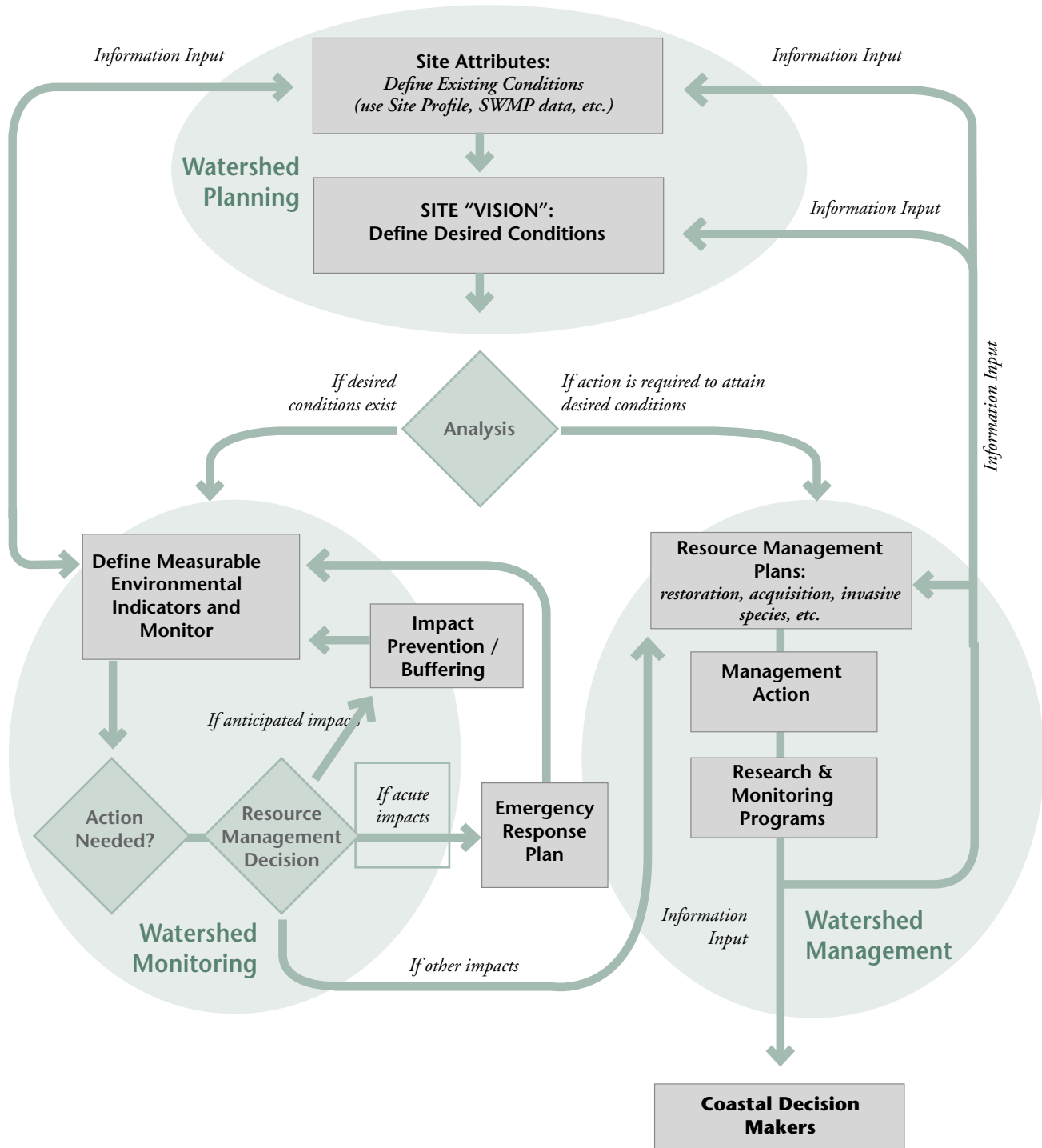
Developing and Implementing the Framework

The Reserve will establish a Framework Advisory Group, which will include landowners and stakeholders in the South Slough watershed, representatives of agencies and academic institutions with experience in adaptive management methods, state and

The Framework for Watershed Stewardship includes three components:

- *Watershed Planning*
- *Watershed Monitoring*
- *Watershed Management*

Figure 6.2: Framework for Watershed Stewardship



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Figure 6.3: Components of the Framework for Watershed Stewardship

Watershed Planning

- Define existing ecological conditions and levels of development and human activity in the South Slough watershed.
- Articulate a vision for the South Slough watershed; define desired ecological conditions and level of development and human activity in the South Slough watershed.

Watershed Monitoring

- Identify measurable environmental indicators that collectively describe the ecological integrity of the Reserve and South Slough watershed and establish protocols for monitoring them.
- Monitor environmental indicators and produce an annual assessment of the health of the South Slough watershed.
- Periodically review environmental indicators to ensure they effectively characterize the ecological integrity of the watershed.
- Review the efficacy of management actions to maintain the Reserve and the South Slough watershed consistent with the collective watershed vision.

Watershed Management

- Implement watershed management plans (for acquisition, restoration, invasive species, emergency response) to address existing or developing resource management issues within the South Slough watershed
- When possible, design watershed management actions to address specific research questions using the Inquiry-Based Information Services (IBIS) model.

local government, watershed associations, and the South Slough NERR Management Commission. Through a series of workshops, the Framework Advisory Group will assist the Reserve and partners with developing and implementing components of the Framework.

The Reserve is currently involved in several ongoing and proposed initiatives supported by NERRS that have potential to provide significant science-based support for the Framework. A coastal watershed habitat classification scheme, habitat inventory, and land use and habitat change analysis will be

integral to Framework planning. The System-Wide Monitoring Program (*see Research chapter, page 4-20*) can offer highly relevant, long-term datasets for water quality, emergent and submerged aquatic vegetation, and weather that may serve as environmental indicators for the South Slough estuary. The Restoration Science Program currently under development by the NERRS is also expected to provide support for restoration planning and monitoring (*see Restoration Plan below*).

The results of watershed monitoring and management actions, particularly research findings, will be made available to coastal decision-makers in a variety of formats. For example, the annual watershed health assessment and supporting environmental indicator data will ultimately be accessible on a Framework website which will serve as a community outreach tool for the Reserve and the local community. Web pages for the Framework will be developed and linked to the South Slough NERR website.

Resource Management

Active management of Reserve lands and the South Slough watershed is an integral part of the Framework for Watershed Stewardship. The following tools will be used to guide management actions implemented by the Reserve:

- Administrative rules intended to protect the ecological integrity of the Reserve (*see Appendix D*).
- Land use and resource management plans.
- Inquiry-based information services to address coastal resource management issues (*see Inquiry-Based Information Services, page 6-16*).

Land use and Resource Management Plans

As part of the Coos estuary and watershed, land uses within the Reserve are subject to the provisions of the Coos County Comprehensive Plan (1984) and its accompanying document, the Coos Bay Estuary Management Plan (1983). These comprehensive land use plans were developed under the guidance of the Oregon Coastal Management Program, which is administered by the Department of Land Conservation and Development with funding from the federal government under the Coastal Zone Management Act of 1972.



Monitoring marsh vegetation



South Slough NERR is also dependent on regional planning efforts for the spill response plan for the South Slough and the Coos estuary. The Coos Bay Geographic Response Plan was developed by the Coos estuary subcommittee of the Oregon Coast Oil Spill and Marine Safety Committee in 1994 and updated in 1996, 1997, 1999 and 2000. The plan outlines actions to be taken in the event of a spill. It includes mapped locations and descriptions of susceptible habitats, equipment caches, and oil collection boom sites. The plan identifies booms stored in Charleston near the mouth of South Slough to be deployed in a sequence that intercepts oil before it enters South Slough on a flooding tide.

Management actions by the Reserve are described in a series of plans that have recently been developed or will be developed in the next planning period. Descriptions of these plans follow:

1. South Slough NERR Cooperative Plan for Watershed Conservation

In 1999, the Reserve completed the South Slough NERR Cooperative Plan for Watershed Conservation (Cooperative Plan) to guide habitat acquisition by the Reserve within the context of local and regional conservation efforts (*see Appendix I*). The Cooperative Plan was prepared with the assistance of an advisory group (Cooperative Plan Advisory Committee) made up of representatives of the communities served by the South Slough NERR. The plan was developed to address inconsistencies between Reserve programmatic mandates and the habitats found within the Reserve's administrative boundary. The present South Slough NERR administrative boundaries do not adequately advance the NERRS goals of both representing estuarine habitat types for the Lower Columbia bioregion (Columbia River to Cape Mendocino), and maintaining them as long-term sites for research and education. The current boundaries include six of the eleven estuarine habitats that typify South Slough NERR's bioregion.

The Reserve would be in a better position to implement watershed-scale research within the Reserve if it managed, or participated in the management of, the

upper portions of sub-basins tributary to the South Slough estuary (see Figure 6.4). Virtually all water enters the Reserve through lands for which the Reserve has no management responsibility. In addition, third parties continue to hold mineral rights to lands which are under Reserve management. South Slough NERR can best serve its mission by acquiring management responsibility of lands primarily in the South Slough watershed from willing landowners through a variety of fee-simple and less than fee-simple means.

2. Habitat Restoration Plan

Habitat restoration at the South Slough NERR is intended to improve the ecological integrity and representative character of the Reserve, provide habitat for threatened and endangered species, and address information gaps in the science of habitat restoration. A Habitat Restoration Plan for the Reserve will establish the need for habitat restoration, identify restoration sites, and describe restoration strategies, priorities and timelines.

A significant element of the Habitat Restoration Plan will be its integration with the NERRS Restoration Science Program (RSP). The RSP, still under development, is designed to support any number of restoration planning and monitoring actions related to restoration efforts at NERRS sites, and is aimed at improving the science of habitat restoration. When fully implemented, the RSP will likely influence the priorities of Reserve's restoration plan. South Slough NERR staff is participating in the development of strategies to implement the RSP.

The Habitat Restoration Plan will also benefit from other NERRS-supported programs, including the coastal watershed habitat classification and habitat inventory

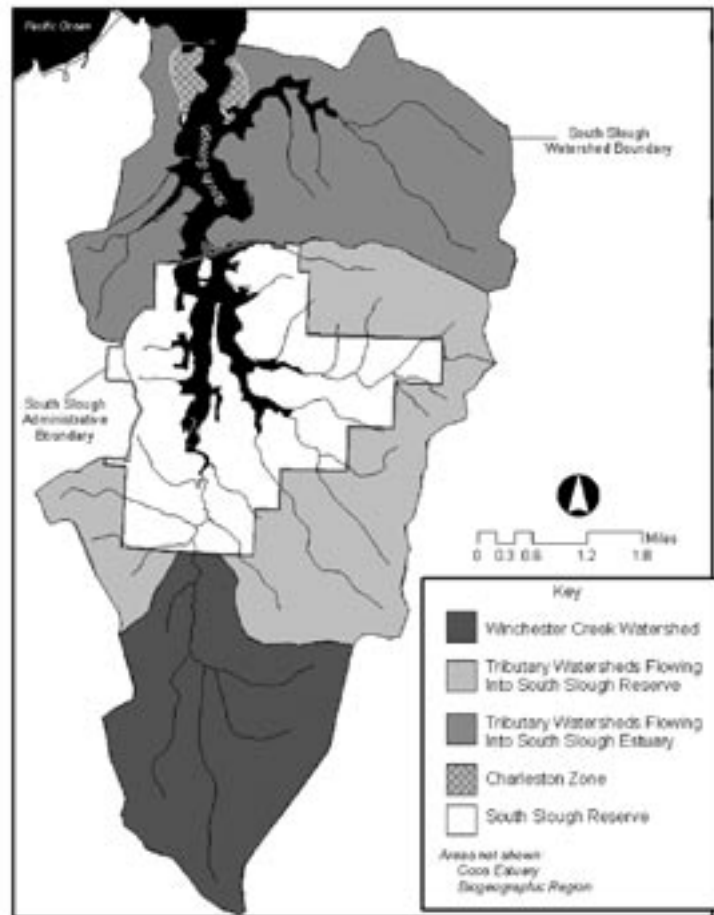


Figure 6.4: South Slough NERR Priority Acquisition Areas



Anderson Creek restoration project

initiatives currently under development. In addition, an initiative to map and analyze land use and habitat change holds significant promise for providing the plan with historic context for habitat alterations in the Reserve.

In establishing the need for restoration at the Reserve, the Habitat Restoration Plan will outline the habitat attributes and natural processes significantly altered by human activities. The plan will describe the direct and indirect effects of those alterations on the physical and ecological processes within the Reserve and the South Slough watershed, and on human health and the local and regional economy.

Lessons learned from the multiple projects implemented and monitored as part of the WTRP, as well as site and ecosystem analyses completed as part of the Site Profile of the South Slough National Estuarine Research Reserve, will be applied to the development of the Reserve's restoration strategy. The roles of volunteers and community participation will be defined for each project and opportunities for educational activities, interpretation, and public outreach will be included in project planning.

3. Invasive Species Control Plan

An Invasive Species Control Plan for South Slough NERR will identify the plant and animal species that most significantly affect the ecological integrity of the Reserve, as well as those affecting the South Slough and Coos watersheds. Because invasive species spread so readily and honor no boundaries, the plan will also address invasive species not yet present in the Coos estuary but which have the potential for becoming established. For that same reason the Invasive Species Control Plan must be developed in partnership with county, state and national invasive species control efforts. Since invasive species are frequently addressed as part of habitat restoration projects, the Invasive Species Control Plan will be developed in coordination with the Reserve's Habitat Restoration Plan. The plan will also benefit from the NERRS-supported programs and initiatives previously described.

Areas of invasive species infestation will be mapped using GIS in order to evaluate control efforts undertaken by South Slough NERR and partners.

A control strategy will be developed for each of the identified invasive species, prioritizing a control strategy based on the levels of infestation and of ecosystem damage, ecosystem damage potential, and rate of spread.

Public outreach and education is critical to control the spread of invasive species. Similar to the Habitat Restoration Plan, invasive species control strategies will be developed to include multiple levels of community participation.

Watershed Stewards

The Stewardship Program will work with the Reserve staff to develop and implement a Watershed Stewards Program. The program will provide residents of the South Slough watershed with a variety of ways to become involved in stewardship, such as volunteering to work on stewardship projects or opportunities to learn about to specific watershed management issues. This program could be modeled after or implemented in partnership with Oregon State University Extension Service's Watershed Stewardship Education Program and has the potential to be an integral part of the Reserve's volunteer program.

Inquiry-Based Information Services

An integrated information gathering and sharing process, Inquiry-Based Information Services (IBIS), provides the Reserve with a new approach for applying staff, programs, and resources directly to natural resource management questions and information gaps articulated by the coastal decision-maker audiences. The IBIS builds on data collection and dissemination processes already used by Reserve staff by integrating Coastal Training Program outreach elements. A needs assessment will be used at the beginning of the process to ensure relevance and usefulness of the information being collected. Using decision-maker workshops and other outreach tools at the end of the process ensures efficiency and effectiveness of information sharing.

Needs assessments conducted by the CTP are designed to identify information gaps from various coastal decision-maker audiences on specific issues associated with the stewardship of coastal



Restoration field crew

watersheds. Depending on the audience and the questions asked, Reserve staff will form an integrated team (including external partners as appropriate) to develop demonstration projects. The demonstration projects will be designed to provide science-based information that can be used to answer specific natural resource management questions.

South Slough NERR has incorporated IBIS into the Reserve's CTP strategy and has commenced testing the development of demonstration projects. Since each project will likely be different, depending on the audiences and questions articulated, a flexible approach is necessary. The IBIS process will team coastal decision-makers together with the Reserve's programmatic resources as well as with the technical expertise of Reserve partners in a process that will result in the discovery and development of objective, science-based information directly relevant to the needs of coastal communities. As currently envisioned, the IBIS process consists of the several steps (*see Figure 6.5 on the following page*).

Figure 6.5: The Inquiry-Based Information Services Process

1. Issues relevant to specific coastal decision-maker audiences are identified via a CTP needs assessment
2. Issues are refined to those questions appropriate for Reserve staff and/or partners to address.
3. When possible, Reserve staff and/or partners use existing literature to address questions and make information available to the coastal decision-maker audience(s) and the public.
4. Demonstration project is developed for questions that cannot be addressed by existing literature and require new data collection and analysis.
5. Funding plan/grant application(s) are developed.
6. Demonstration project is implemented.
7. Data is collected and analyzed.
8. Information from demonstration project is disseminated through a variety of formal and informal means to coastal decision maker-audience(s) and the public.



Action Plan for Stewardship

Goal 1. Manage and restore the habitats and ecosystem processes associated with the South Slough NERR using an adaptive management approach.

Objective 1.a. Develop and implement the Framework for Watershed Stewardship.

Tasks

- Establish a Framework Advisory Group, consisting of staff, technical advisors, coastal decision-makers, and community members, to assist the Reserve with developing and implementing the Framework for Watershed Stewardship.
- Define existing ecological conditions and levels of human activity in the South Slough watershed.
- Develop vision of desired ecological conditions and levels of development for the South Slough watershed.
- Identify measurable environmental indicators and monitoring protocols to track change in the South Slough watershed.
- Design and establish an environmental indicators website.
- Using resource management plans, determine management responses to changes in the South Slough watershed.

Objective 1b. Monitor conditions in the South Slough watershed.

Tasks

- Participate in the development and implementation of the NERRS land use and habitat change initiatives.
- Participate in the development and implementation of the NERRS habitat classification and inventory initiative.
- Monitor environmental indicators to track changes in the watershed.
- Conduct effectiveness monitoring for South Slough



The Stewardship Program will use the IBIS process to engage coastal decision-makers in the following priority areas:

1. *Habitat restoration*
 - a) *Restoration and management of coastal forests*
 - b) *Enhancement and management of salmon habitat in former tidal wetlands, including lands managed for agricultural purposes*
 - c) *Improved habitat restoration of estuarine wetlands*
2. *Invasive species*
 - a) *Identification and mapping of invasive species*
 - b) *Eradication and control of invasive species*
3. *Marine protected areas*

NERR watershed management and restoration actions.

- Continue salmon life history monitoring in South Slough and expand these efforts in Coos estuary sites.
- Plan and initiate baseline monitoring for upland forest and Wasson Creek restoration projects.
- Participate in the planning and implementation of the SWMP long-term emergent and submerged aquatic vegetation monitoring.

Objective 1c. Develop and implement resource management plans for habitat restoration and invasive species.

Tasks

- Participate in the implementation of the NERRS Restoration Science Initiative.
- Building on restoration work completed as part of the Reserve's Winchester Tidelands Restoration Project, establish restoration strategies for South Slough NERR aquatic habitats.
- Establish a Coastal Forest Management Advisory Group to provide guidance for developing forest management and uplands restoration strategies for the Reserve.
- Facilitate partnerships to identify invasive species control strategies for the Reserve and to develop a more coordinated approach to invasive species control in Coos County.
- Continue ongoing invasive species control at South Slough NERR and in the Coos watershed.
- Implement resource management plans to systematically move existing ecological conditions towards desired conditions.

Goal 2. Provide for a diversity of high quality estuarine and coastal habitats representative of the Lower Columbia biogeographic province.

Objective 2a. Review the status of the South Slough NERR Cooperative Plan for Watershed Conservation with the Cooperative Plan Advisory Committee and use the Committee’s recommendation to implement the Plan.

Objective 2b. Continue with next steps of the proposed trade between Coos County BLM.

Objective 2c. Pursue opportunities to develop partnerships with BLM, Coos County, the Trust for Public Lands, the Archeological Conservancy, The Nature Conservancy, and other public and private land managers, as a less than fee-simple strategy to expand the Reserve’s ability to address the goals of the South Slough NERR Cooperative plan for Watershed Conservation.



Monitoring juvenile fish populations

Goal 3. Collaborate with local, regional, and national agencies and organizations to address natural resource management issues affecting estuaries and coastal watersheds.

Objective 3a. Test and demonstrate stewardship practices and innovative land management strategies through Inquiry-Based Information Services (IBIS).

Tasks

- Solicit, articulate, and refine coastal decision-maker questions using CTP needs assessments.
- Design and implement integrated demonstration projects and data collection protocols.
- Provide information and recommendations from demonstration projects to coastal-decision makers.



Objective 3b. Strengthen partnerships and develop collaborations with natural resource management organizations, academic institutions, and the public.

Tasks

- Develop and implement cooperative projects with local and regional watershed associations.
- Participate in updating the Coos Bay Geographic Response Plan.
- Convene existing advisory groups to as necessary to project development and implementation (i.e., Estuarine Wetlands Restoration Advisory Group, Conservation Plan Advisory Committee).
- Coordinate with the Public Involvement Coordinator to develop a Watershed Stewards Program at the South Slough NERR.

Objective 3c. Provide technical assistance to partners and watershed decision makers as appropriate.

Tasks

- Participate in the development of various estuarine wetland restoration and mitigation projects locally and regionally.
- Present restoration and salmon life history monitoring and watershed management results at local, regional, and national meetings.
- Publish restoration and salmon life history monitoring and watershed management results in reports and technical journals.
- Lead field trips to restoration, monitoring, and watershed management sites at the Reserve for groups of coastal decision-makers and agency and watershed association representatives.

6

7

Administration

South Slough National Estuarine Research Reserve
Management Plan



Chapter 7: Administration

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Administration

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Trail and bridge



South Slough and Valino Island

The mission of the administrative services program at the South Slough National Estuarine Research Reserve is to provide a framework for human and fiscal resource management and coordinate policies and processes to support Reserve programs and operations. This framework is intended to foster intra- and inter-agency cooperation to achieve effective management of the Reserve. Effective and proactive management is essential to support the mission of the South Slough Reserve. The Administrative Services program is also responsible to ensure that Reserve operations are performed by trained staff members who strive for excellence in work performance, interpersonal relationships and communication skills, and that research, education, and stewardship programs are supported by involved and informed staff.

Goals

The goals for South Slough NERR Administration for 2004-2009 are to:

- Goal 1. Develop, refine, and implement an administrative framework that promotes collaboration and enables the reserve to responsibly manage finances and programs and to take full advantage of funding opportunities.**
- Goal 2. Provide a stimulating professional environment to ensure that all staff members are adequately trained and strive for outstanding performance and interpersonal relationships.**
- Goal 3. Create opportunities for public participation that increase the understanding and stewardship of estuaries, expand the operational capacity of the Reserve, and provide meaningful experiences and benefits to participants.**

Goal 4. Facilitate the development and implementation of clear policy direction and guidance in the management of the Reserve.

Background

The Reserve's administrative services program supports human resources and facilities along with the research, education, and stewardship programs. Grant monitoring, fiscal reconciliation with the Oregon Department of State Lands (DSL), and guidance for general operations are provided through administrative staff and processes. Administrative services are closely aligned with facilities operations at the Reserve since both support all program areas of South Slough NERR.

Administrative Framework and Fiscal Management

South Slough NERR is a cooperative federal-state partnership between the National Oceanic and Atmospheric Administration (NOAA) and the Oregon Department of State Lands. NOAA provides funding, national guidance, and technical assistance to the Reserve. The South Slough NERR Management Commission is responsible for conducting the day-to-day operation and management of the South Slough Reserve with the administrative support of the Department of State Lands (*O.R.S. 273.554 (a)*). The Department of State Lands is a state agency under jurisdiction of the State Land Board, which is composed of the Governor of Oregon, the Oregon Secretary of State, and Oregon State Treasurer. A memorandum of understanding outlining the agreement between NOAA and the state of Oregon is presented as Appendix J.

The Reserve applies annually for funds from NOAA that are used to support research, education, and stewardship programs and Reserve operations. NOAA funds may also be requested for special projects, facilities construction, and land acquisition. NOAA guidelines require a 30% non-federal cost share for operations and construction awards and a 50% cost share for acquisition. The state is obligated to provide 30% matching funds for NOAA awards dedicated to facilities construction Reserve operations and 50% match for land acquisition projects. South Slough NERR also



Maintenance staff constructs trail bridge



Brittle stars in nearshore waters

applies for, and is dependent on, grants and contracts from a variety of sources to support many of the projects undertaken by the Reserve's programs.

Role and Responsibility of NOAA

NOAA's Estuarine Reserves Division (ERD) administers the overall National Estuarine Research Reserve System (NERRS) and provides support for the reserves. ERD disburses and oversees expenditures of federal funds. ERD also coordinates the design and implementation of system-wide programs, provides guidance for the development of NERRS policies, and is responsible for ensuring that the Reserve is managed according to NERRS policies and regulations.

As required by federal regulations (*15 C.F.R. Part 921.40*), NOAA periodically evaluates the performance of the Reserve for compliance with federal requirements and with the Reserve's federally-approved management plan. The last performance review (312 evaluation) of South Slough NERR's programs and operations was conducted in 2004.

Role and Responsibility of DSL

The role and responsibility of the Oregon Department of State Lands (DSL) in the management of the Reserve is specified in Oregon Law, (*see Appendix C, Oregon Revised Statutes*). (*See Appendix D, Oregon Administrative Rules*). DSL is responsible for completing the purchase of the South Slough Reserve and managing transactions on behalf of the State respecting the purchase of acreage for the Reserve (*O.R.S. 273.553(2)*). DSL is also responsible to provide administrative support to the South Slough NERR Management Commission (*O.R.S. 273.554(1)(a)*).

South Slough NERR receives administrative support and oversight from DSL which provides the Reserve with fiscal recordkeeping, technological support, and assistance with human resources. Core Reserve staff are DSL employees. Funding for the Reserve, from NOAA and other sources, is administered through DSL.



Tidal channel and salt marsh

South Slough NERR Management Commission

Oregon statute (*O.R.S. 273.554*) created the South Slough NERR Management Commission (Commission) as the Reserve's sole governing body. The Commission is

responsible for the day-to-day operation and management of the Reserve including establishing operating policies and administrative rules for the operation of the Reserve.

As per state statute, the nine members of the Commission are appointed by the Governor and serve as representatives of specific institutions, agencies, and other constituencies (*see Figure 7-1*). The Director of DSL (or a designee) serves as permanent chair of the Commission. The authority of the Commission is to be consistent with the policies formulated by the State Land Board as well as state and federal laws.

The South Slough NERR Management Commission is empowered by statute to appoint a manager and other staff, through whom the Commission conducts the day-to-day management and operations of the Reserve. The Commission may apply for, receive, and expend federal, state, and other funds for Reserve purposes. Commissioners review Reserve activities and proposed initiatives at quarterly public meetings.

Figure 7-1: State Land Board

South Slough Management Commission (appointed by governor to four-year terms)

- Position #1 Education
- Position #2 Public
- Position #3 Oregon International Port of Coos Bay
- Position #4 Director of Department of State Lands
(commission chair)
- Position #5 Office of Ocean and Coastal Resources
Management (non-voting)
- Position #6 University of Oregon Institute of Marine
Biology
- Position #7 Oregon State University
- Position #8 Coos County Commission
- Position #9 Oregon Indian Tribes

Commission Advisory Group

In 1974, the South Slough NERR Management Commission adopted rules (*O.A.R. 142-10-010*) which created a “Citizens’ Advisory Group” and a “Scientific/Technical Advisory Group,” both to be appointed by the Commission. These groups were merged in 1984 into a single Advisory Group composed of individuals with a range of expertise in science, business, and management. Appointments to the Advisory Group are made by the Commission. Advisory Group members serve two-year terms. Existing members of the Advisory Group forward nominations to the Commission to fill vacant positions (*see Appendix K for Advisory Group bylaws*).



Canoeing and kayaking are popular educational activities

Although the Advisory Group has no binding authority over the Commission, it must be consulted by the Commissioners prior to application of chemical fertilizers, herbicides, or pesticides; prior to approval of any tree removal in the Reserve; and prior to any closure of a public Reserve area or suspension of an otherwise permitted public activity. Upon request, Advisory Group members also provide the Commission with objective assessments of impacts from existing or proposed Reserve policies. The group may be consulted on any other topic as requested by the Commission.

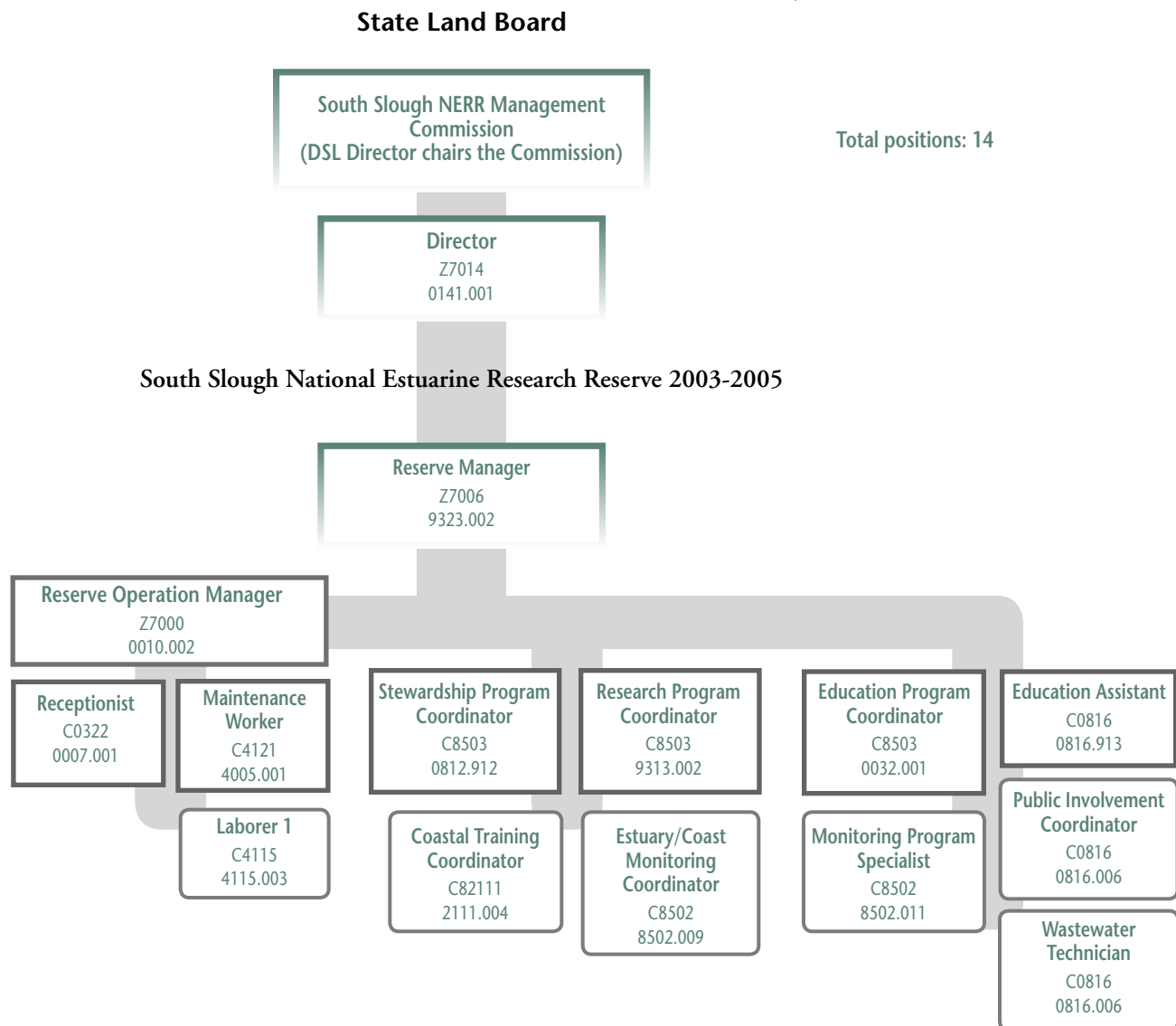
South Slough NERR Policies

South Slough is managed in accordance with NERRS Program Regulations (*15 C.F.R. 921 et seq.*) Oregon Statute (*O.R.S. part 273.553*) and South Slough NERR Administrative Rules (*O.A.R. chapter 142, Division 10 142-10-005 et seq.*) The federal regulations govern the administration of NERRS programs, grants, and funding (*see Appendix A*). State Statutes and Administrative Rules support the objectives of the NERRS by establishing policy for the operation of the reserve and public use of the Reserve (*see Appendix C, Oregon Revised Statutes.*) (*See Appendix D, Oregon Administrative Rules.*) These regulations and rules are used in combination with South Slough NERR stewardship policies to manage and protect the resources and integrity of the Reserve. Research, education, and stewardship policies are addressed in other chapters of this plan. The following section addresses the policy regarding public uses of the Reserve.

Public Use of the Reserve

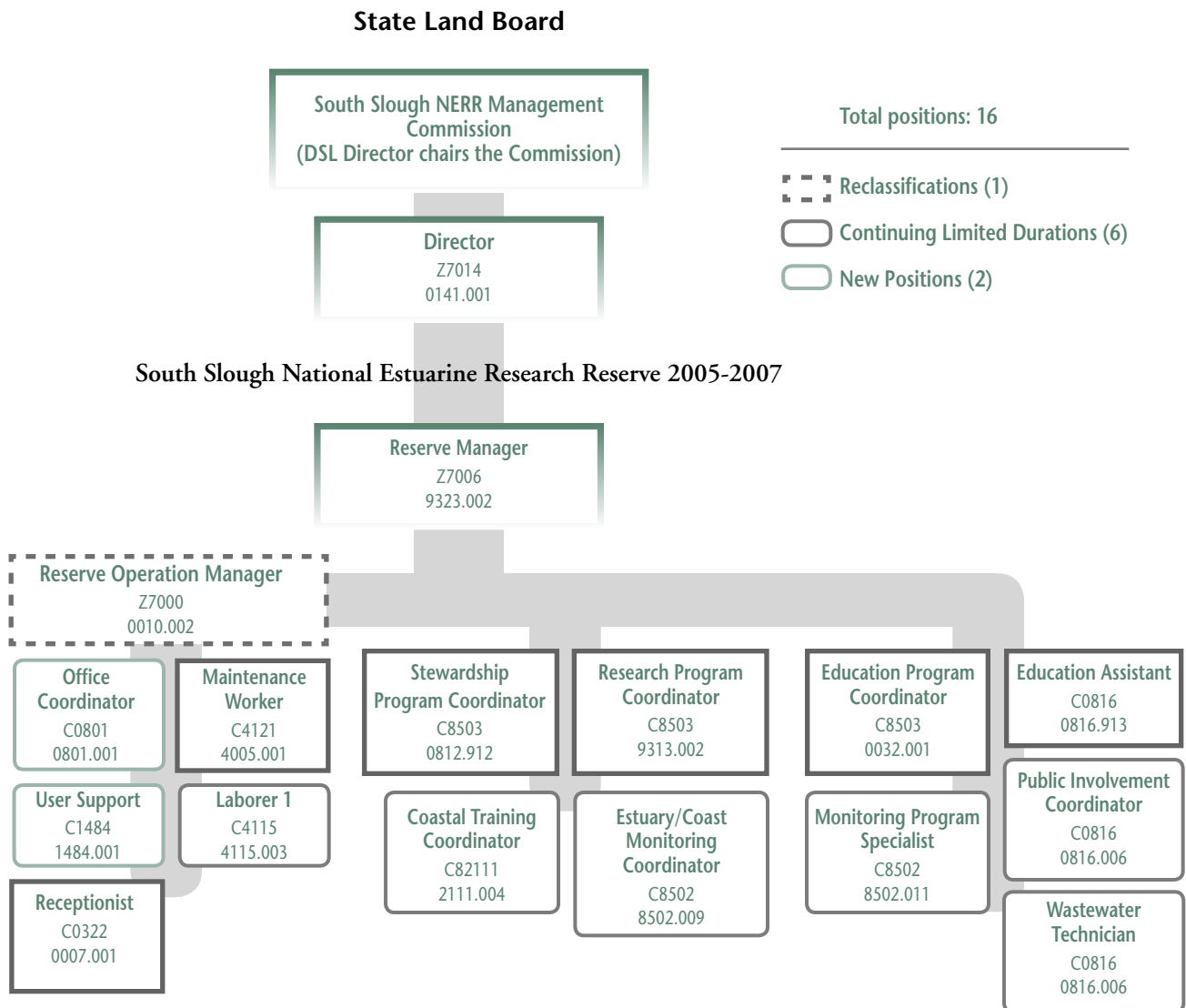
Public visits to the Reserve advance the goals of the NERRS by expanding citizen awareness of the NERRS, and by increasing opportunities for the public to physically experience an estuarine setting. Public access to the Reserve, however, must be consistent with NERRS and state policies. Reserve management may facilitate public access, but its primary obligation under federal and state mandates must be to maintain the integrity of the Reserve, protect it from uses and activities which may alter or affect the ecosystem and its processes, and preserve the area for long-term scientific and educational uses (*O.R.S. 273.553 (1)*).

Figure 7-2: South Slough Staff Positions



State Administrative Rules provide that: *“All publicly owned areas of the Reserve are available to scientists, students and the general public on a basis desirable and permissible for coordinated research and educational uses and for other compatible uses to the extent they do not interfere with the primary management and scientific objectives. (O.A.R. 142-010-0005).”*

Figure 7-3: Revised South Slough Staff Positions



Human Resources

Adequate staffing is essential to the effective implementation of South Slough NERR programs and operations. The Reserve currently meets human resource needs through a combination of full-time staff, part-time positions, contractors, interns, and volunteers.

Reserve Staff

There are currently 14 full-time staff positions at the Reserve, of which eight are permanent and six are limited-duration positions. Of the permanent positions, five are fully-funded by the state of Oregon and three are fully or partially grant-funded (*see Figure 7-2*). Each of the limited-duration positions is grant funded with ongoing support offered each grant cycle.

The staff size fluctuates with the addition of temporary contract workers, students, interns, participants from social services training programs, and others. These positions are supported by federal and private grants, interagency cooperative agreements, state operating funds, student scholarships, and contributions from private sources.

DEVELOPMENT OF STAFF POSITIONS

New staff positions are identified and developed in a number of ways. With new projects and expanding programs, Reserve staff work with management to determine if additional staff are needed. Tasks included in grant proposals developed by program staff identify temporary, limited-duration, part-time, full-time positions as well as volunteer, contractor, and intern positions required to accomplish the tasks. Positions are established based on responsibilities, work load, budget, and other parameters.

The need for some staff positions is identified by NOAA as a prerequisite for participation in certain programs. Participation in some national programs and initiatives requires a program coordinator. The funding available for these programs generally supports the program and necessary staff. The Reserve must apply for these supplemental funds and agree to conduct the programming within the parameters laid out by NOAA. NOAA may also determine additional staffing needs via periodic evaluations.



Researchers navigate the shallows of Winchester Creek



Research cruises are based in Charleston

Volunteers

Volunteer contributions of time and skills greatly enhance the programs and operations of the Reserve. In recent years, volunteers have assisted with visitor services, education programs, trail improvements, habitat restoration and monitoring, and research projects. The Friends of South Slough (FOSS), youth work crews, AmeriCorps, local public support service programs, and individuals from the community all provide volunteer services for the Reserve. The Public Involvement Coordinator is responsible for the development, coordination and maintenance of the volunteer program. For more information about the FOSS, (*see page 7-10*).



AmeriCorps trail-builder

By sharing their enthusiasm for and knowledge of South Slough, volunteers enhance visitor experiences and increase interest and awareness of the Reserve within the region. The Reserve recognizes an obligation to provide interested volunteers with rewarding and enriching opportunities in exchange for their efforts on behalf of the South Slough NERR.

VOLUNTEER PROGRAM

Although the Reserve has benefited through the years from the immeasurable contributions of volunteers, a formally structured Volunteer Program at South Slough NERR is currently in the early stages of development. The establishment of the Public Involvement Coordinator position in 2001 provided the Reserve with staff dedicated to the development and implementation of the Volunteer Program. The addition of this staff position has resulted in the preparation of a draft Volunteer Resource Handbook, which includes information related to the Reserve's mission, resources, programs, and operations. The Public Involvement Coordinator has worked with staff to develop a preliminary list of volunteer job descriptions and a more effective system for appropriately matching volunteer interests to operational needs at the Reserve. With the availability of space, projects, and staff, the Reserve is now able to actively recruit new volunteers.

In 2002, the Reserve piloted a volunteer orientation and training seminar series to provide opportunities for new, existing, and potential volunteers, along with interested

members of the community, to acquire knowledge about the coastal environment and the operations of the Reserve. With the assistance of volunteers, the Friends of South Slough have published a quarterly newsletter with information about the latest happenings at the Reserve.

Partnering Agencies and Organizations

The management of South Slough NERR recognizes that partnerships with agencies and organizations enhance the ability of each entity to be more efficient, effective, and productive. The Reserve has entered in several partnerships which have been formalized with memoranda of understanding or other contracts. South Slough NERR actively seeks partnerships in the community, regionally, and nationally in support of joint projects and efforts guided by the Reserve's vision statement (*see Appendix E for a list of partners*).

Friends of South Slough

The Friends of South Slough is a non-profit organization incorporated in 1988, with a current membership of over 100 individuals. The mission of FOSS is to promote and assist the Reserve in program activities, principally by raising funds and obtaining in-kind donations. Any individual or group supporting the goals of FOSS may become a member.

The Friends of South Slough is a continuing source of support for Reserve operations and projects. FOSS operates a gift shop and book sales operation in the Interpretive Center and uses proceeds of sales to enhance their ability to provide support to the Reserve. Most recently, fundraising efforts by FOSS led to a cash gift of \$132,500 designated for renovations to the Interpretive Center and over \$20,000 for the development of new exhibits. In addition to their tangible monetary contributions, FOSS members donate time and talents as volunteers at South Slough NERR. FOSS has also supported a temporary seasonal employee to assist with visitor services and the bookstore on weekends during the summer.



Salt marsh explorations



Students learn at shoreline



Miner's lettuce in bloom



False lily-of-the-valley

Legislation, effective January 2004, enables the Department of State Lands to more fully develop its relationship with FOSS. The management of the Reserve, already works closely and collaboratively with FOSS, and will continue to develop this partnership and explore methods to enhance fundraising and utilize resources that serve both entities.

Community Partner Organizations

Administrative services at the Reserve have benefited from collaborations with several local organizations. The Charleston Merchants Association (CMA) is a non-profit association of merchants who work together for mutual enhancement of their businesses. CMA operates a visitor information center in Charleston providing an important

public interface in the Northern portion of the South Slough Watershed. The information center serves as an important outlet for information about the Reserve and a starting point for many of the Reserve's field based interpretive programs.

The Charleston Community Enhancement Corporation is another local non-profit group that works on projects of mutual interest to generate tourism and return visits to the area. This group has expressed interest in working with the Reserve to write grants and administer funds. The Reserve is currently working in partnership with this group to develop and improve pedestrian walkways in the community of Charleston.

The South Coast Business Enhancement Corporation (SCBEC) is a public service organization that funds and coordinates training opportunities for individuals entering the workforce for the first time, or returning to the workforce after time away. Periodic trainee placements from SCBEC provide the Reserve with administrative and visitor services assistance.

The Oregon Coastal Environments Awareness Network (OCEAN) was formed in 1992 by a group of individuals representing industry, business, state and federal agencies, educators, and conservation organizations. As one of the founding members of OCEAN, South Slough Reserve has cooperated with other partners in the organization to sponsor and participate in various projects that promote an awareness and understanding of natural and cultural resources along the southern Oregon coast for residents and visitors to the region.

The University of Oregon Institute of Marine Biology (OIMB) occupies a 107-acre site in Charleston. The facility conducts research and offers courses in marine biology and related fields. The South Slough Reserve maintains a Memorandum of Understanding with OIMB to share administrative resources and laboratory facilities (*see Appendix L for the MOU between South Slough NERR and OIMB*).

The Reserve collaborates with OIMB in the NERRS Graduate Research Fellowship (GRF) program which supports graduate students conducting research in the Reserve. The South Slough NERR Research Coordinator holds an adjunct faculty appointment with the University of Oregon Biology Department, and serves as an advisor for graduate thesis committees. He collaborates with other faculty members at the University to conduct and direct management-oriented research. South Slough NERR is working to increase collaboration with regional tribes on appropriate projects. To facilitate tribal participation and input, the Reserve has established a place on the South Slough NERR Management Commission for a representative of coastal tribes.

The Coos Watershed Association (CWA) represents a variety of land management interests in the local community and is responsible for initiating many innovative management practices in the area of effective watershed management. As a founding member of the CWA the South Slough Reserve has coordinated with CWA on a number of projects and have established an excellent working relationship. The staff members of the CWA have strong professional credentials and have the institutional capacity to solicit and administer grant funds. The Reserve Manager has served on the Board of Directors of the CWA and since the the non-profit organization was formed in 1993.

Accomplishments 1994-2006

During the 1994-2006 period, the administrative program at the reserve was responsible for the following program accomplishments:

- Established the following new staff positions to accommodate Reserve program development:
 - Stewardship Program Coordinator
 - Education Program Assistant



A squirrel gets dinner from the forest



Director Ann Hanus, Department of State Lands, signs a Memorandum of Understanding with the National Oceanic and Atmospheric Administration setting forth the terms of operation of the South Slough National Estuarine Research Reserve.

- Coastal Training Coordinator
- Regional Watershed Coordinator
- Restoration Monitoring Coordinator
- SWMP Nutrients Technician
- SWMP Bio-monitoring Technician
- Public Involvement Coordinator
- Maintenance Assistant
- Converted the following staff from limited-duration positions to permanent positions:
 - Research Program Coordinator
 - Stewardship Program Coordinator
 - Education Program Assistant
- Established a second management service position (Operations Manager) to assist with managerial duties and to provide continuity when the Manager is away from the Reserve.
- Enhanced communication and coordination between facilities on the Reserve campus (Interpretive Center, Estuarine and Coastal Sciences Laboratory, and Maintenance Facility) and between South Slough NERR and the DSL office through improved telecommunications technology, monthly business meetings, and improved financial tracking and reporting procedures.
- Developed and administered a variety of interagency agreements, memoranda of understanding, and contracts to implement program and construction projects including the following:
 - Construction and operation of the Estuarine and Coastal Science Lab on the campus of the Oregon Institute of Marine Biology (OIMB)
 - Renovation and additions to the Interpretive Center
 - Preparation of a feasibility study to relocate the South Slough administrative offices with the Charleston Visitors' Center near the Charleston waterfront
- Created a formal volunteer program with organization, training, and oversight provided by the Public Involvement Coordinator.
- Formalized the relationship between South Slough NERR and the Friends of South Slough via legislation passed in 2003 by the Oregon Legislature.

- Revised Oregon statute to include a tribal member on the Management Commission.
- Revised Oregon statute to authorize the Management Commission to charge and collect fees.

Needs

Improved Communications

As the Reserve's programs, facilities, and staff have developed, the need for improved communications has become increasingly apparent. South Slough NERR needs strategies for public relations and to coordinate the dissemination of information about the Reserve. Updated and improved computer and electronic technology is also needed to facilitate internal communication.

Guidance for Use of the Reserve

The current Administrative Rules (*O.A.R. 142-010*) were last revised in 1995 and are specific to the public uses of South Slough NERR. They do not explicitly address the use of the Reserve for research, education, stewardship, commercial activities, or other purposes. The Reserve needs additional and updated Administrative Rules that provide guidance for staff activities in the Reserve. The Reserve also needs to develop and implement policy rules on the use of its facilities, in particular its new lecture hall, which was constructed in 2002.



On the trail at South Slough

Internal Reserve Policies

The Reserve has developed new facilities and expanded programs, but internal policies to direct programs and operations have not been updated. In particular, the Reserve needs policies to provide guidance for building uses, external communications, volunteers, and the Reserve's relationship with FOSS.

Partnerships in the Local Community

South Slough NERR is physically linked to the communities of Charleston, North Bend, and Coos Bay. Local partnerships are important to the successful implementation of the Reserve's programs and operations. In order to better address local and regional issues and to expand outreach efforts, the Reserve needs to further develop partnerships in the local community.

Process to be Responsive to Needs for Personnel

With only eight permanent positions and on full or partial state funds, the Reserve depends on a variety of sources to fund the staff necessary for programs and operations. Regardless of source, funding is administered through DSL and the Reserve must seek and obtain position authority from the State before it can hire staff. The Reserve needs the ability to develop staff positions in response to expanding programs and operations, and a process whereby it can use project funding to hire necessary staff in a timely manner.

Additionally, in order to ensure a knowledgeable staff engaged and satisfied by their work, the reserve needs to provide opportunities for professional development.

Information Technology Assistance

Due to its remote location and dispersed facilities, providing effective and efficient support for information technology at South Slough is challenging. Presently, there is no one person on staff that has expertise in computers, networks, and telecommunications, and the Reserve depends on DSL personnel from Salem for maintenance and assistance. Additionally, South Slough NERR has no staff expertise in website management and GIS, technologies that are integral to the Reserve's programs and operations. The Reserve needs on-site staff expertise to provide information technology assistance.

Administration 2006-2011

During this planning period, administration at the Reserve will focus on developing staffing strategies to better meet the needs of the Reserve, further developing the Volunteer Program, fostering partnerships in the local community, providing efficient and effective fiscal management, developing and revising rules and policies for use of the Reserve and its facilities, and providing the Reserve with effective computer, information, and communication capabilities.

Communications Plan

In response to communication needs, the Reserve will collaborate with communications specialists at DSL and NOAA to develop an integrated communications and outreach plan. This plan will provide guidance for the development of the Reserve's website and other outreach/ information media. A communications plan will serve as public relations tool, with policies for developing and distributing materials that provide accurate information and a consistent message.

Information Technology

Reserve staff has identified needs associated with the development of GIS products, the creation and maintenance of the South Slough NERR website, and technical computer and network system support. These technology needs will best be met through improvements in telecommunications infrastructure and through the creation of an Information Technology position. The Reserve recently obtained funding and position authority for an on-site Information Technology staff position. This position will provide the Reserve with necessary expertise in GIS, website management, and computer network support. The Reserve needs to develop a telecommunications plan that defines the infrastructure required to support voice and data communications within the reserve and linkages between the reserve and other telecommunications systems.

Revise Administrative Rules

South Slough NERR needs Administrative Rules that guide all uses – by the public, commercial interests, and staff – of the Reserve. The staff will coordinate with the South Slough NERR Management Commission to review the current Administrative Rules for the Reserve and, if deemed necessary, make recommendations for revisions.

Facilities Use Policies

The Reserve will develop policies to guide the use of South Slough NERR facilities. Allowed uses of the Interpretive Center and associated equipment, particularly the lecture hall, will be defined and a policy manual will be developed.



South Slough Interpretive Center's early days.



Overlooking the South Slough watershed

FOSS Policies

In response to legislation that formalizes its relationship with the Friends of South Slough, the Reserve will develop policies that guide this legal arrangement and future collaborations with FOSS.

Volunteer Program Development

The Volunteer Program will benefit from the cooperative efforts of the Public Involvement Coordinator and staff to further identify and define volunteer positions, to revise, and distribute the Volunteer Resource Handbook, and to develop a process that addresses the operational needs of the Reserve. Policies for volunteers need to be developed that address training, time commitments and scheduling, use of Reserve facilities and equipment, conduct, and expectations of volunteers and the Reserve. Volunteer orientation and training opportunities will be developed and held on a regular basis.

South Slough NERR will also seek to increase collaboration with the local tribes on appropriate projects. To facilitate tribal participation and input, the Reserve will pursue establishing a place on the South Slough NERR Management Commission for tribal representation.

Action Plan for Administration

Goal 1. Develop, refine, and implement an administrative framework that promotes collaboration and enables the reserve to responsibly manage finances and programs and to take full advantage of funding opportunities.

Objective 1a. Assure fiscal and programmatic accountability at all levels of Reserve operations.

Task

- 1.a.1. Develop protocols and checklists to support the efficient administration of projects that rely on extramural funding.
- 1.a.2. Review the most recent NOAA 312 audit's program suggestions and necessary actions and respond as appropriate.

- 1.a.3. Respond in a timely and appropriate way to State and Federal audits.
- 1.a.4. Continue the history of statutory compliance at all levels of operation.

Objective 1b. Strengthen and build upon institutional partnerships that support the South Slough NERR mission and provide mutual benefit to our partners.

Task

- 1.b.1. Meet with groups and organizations to share project information and develop collaborative projects of mutual benefit to the reserve and the community.
- 1.b.2. Finalize and implement a five year cooperating association agreement between the Department of State Lands and the Friends of South Slough including annual work plans.
- 1.b.3 Continue to support and strengthen administrative relationships with UO/OIMB, OCEAN, The Coos Watershed Association, the Port of Coos Bay and other organizations where these relationships support or enhance the mission of the Reserve. Develop a process to regularly and consistently update ongoing agreements.

Objective 1.c. Oversee the application for and expenditures of state, federal, and other funds in a prudent and efficient, manner with attention to economic conditions, public perceptions, and organizational capacity.

Task

- 1.c.1. In cooperation with South Slough NERR program staff and DSL fiscal office staff, maintain grant records in accordance with reporting requirements and provide timely and accurate grant reports.

Objective 1.d Grant awards in compliance with tasks, schedules, and budgets, and successfully complete grant requirements to maintain the organization's reputation of excellence in project administration.

Task

- 1.d.1 Set and adhere to schedules for work promised in grant applications.
- 1.d.2. Monitor progress and adjust work loads to accommodate pressing deadlines.
- 1.d. 3. Evaluate completed projects and existing grant administration procedures to identify opportunities for program improvement.
- 1.d. 4. Evaluate grant products to identify opportunities for future program development and improvement.
- 1.d. 5. Make budgets available to project managers.

Objective 1.e. Respond as necessary to changing situations or economic resources and ensure staff work goals are reasonable and attainable.

Task

- 1.e.1. Maintain financial records including up to date financial accounting for active grants and budget authorizations.
- 1.e.2. Selectively identify appropriate grants to support Reserve programs and activities. Identify and undertake actions required to obtain appropriate, timely authorization to receive and expend grant funding.

Goal 2. Provide a stimulating professional environment to ensure that all staff members are adequately trained and strive for outstanding performance and interpersonal relationships.

Objective 2a. Facilitate staff development through training, and enrichment, experiences that foster professional growth. (Note: Meeting this objective will assure compliance with the 2004 Federal audit of the Reserve where the State is called upon to “support opportunities for staff professional training and development.”)

Task

- 2.a.1. Budget funds to support staff training.
- 2.a.2. Develop opportunities to provide cross training.
- 2.a.3. Evaluate processes and training outcomes.

Objective 2b. Build an organizational culture of support and trust, encouraging individual and group successes to advance the objectives of the organization.

Task

- 2.b.1. Invite broad participation in all Reserve activities.
- 2.b.2. Offer ongoing group training in communication techniques.
- 2.b.3. Discuss program successes in group setting.
- 2.b.4. Encourage and reward positive behavior.

Objective 2c. Develop a collaborative work style among all staff members of the Reserve.

Task

- 2.c.1. Invite cross discipline development.
- 2.c.2. Respect and respond to staff suggestions and ideas.
- 2.c.3. Use coaching and counseling techniques to advocate and encourage group activities.



Deep water terminal at Charleston serves the fishing fleet

Goal 3. Create opportunities for public participation that increase the understanding and stewardship of estuaries, expand the operational capacity of the Reserve, and provide meaningful experiences and benefits to participants.

Objective 3a. Develop and administer a volunteer program involving individual and groups of diverse backgrounds.



Spruce ranch guest house

Task

- 3.a.1. Work with staff to define needs and develop descriptions for volunteer opportunities.
- 3.a.2. Actively publicize opportunities and recruit volunteers for involvement in Reserve operations and programs.
- 3.a.3. Formalize and provide volunteer orientation and training workshops on a regular basis.
- 3.a.4. Design and implement strategies to involve local businesses, community service groups, and other civic organizations, youth groups, and individuals with specialized skills or training in South Slough NERR programs.
- 3.a.5. Respect the interests and abilities of volunteers and acknowledge their contributions and value to staff and the Reserve by offering special opportunities for volunteers (i.e. special presentations, excursions, guided tours, etc.) and by developing a system to publicly recognize outstanding volunteer efforts.

Objective 3b. Provide opportunities for the public to learn about estuaries and South Slough NERR programs through voluntary participation in activities sponsored by the South Slough NERR.

Task

- 3.b.1. Provide opportunities for members of the public to receive training (e.g., natural and cultural history, office procedures, and interpretive techniques) and experience (e.g., public speaking, exhibit preparation, customer service) through participation in the South Slough Public Involvement Program.
- 3.b.2. Coordinate with other volunteer groups in the community to provide diverse, informative, and enriching training opportunities in the community.
- 3.b.3. Develop a strategy to provide consistent, reliable, trained volunteer assistance with visitor services on a year-round basis.

- 3.b.4. Create opportunities to provide job skills training to residents of the community as part of the Volunteer Program.
- 3.b.5. Encourage interaction and information exchange among volunteers via regular meetings, newsletter, and social events.
- 3.b.6. Develop and publish on a regular basis a volunteers' newsletter with information about Reserve-related activities.

Objective 3.c. Building stronger communications links and provide opportunities for people who live and work in the South Slough watershed to participate in South Slough Programs.

Task

- 3.c.1. Assist with the development of the South Slough NERR Framework for Watershed Stewardship through gathering demographic information about residents living in the watershed.
- 3.c.2. Develop an appropriate means to communicate with the residents of the South Slough Watershed.

Goal 4. Facilitate the development and implementation of clear policy direction and guidance in the management of the Reserve.

Objective 4.a. Support the planning needs of the South Slough NERR management commission.

Task

- 4.a.1. Conduct field tours for newer members of the management commission to increase their familiarity with South Slough waters, lands, projects and accomplishments.

Objective 4.b. Objective 4.b. Establish policies related to uses of the reserve for scientific, educational and recreational purposes.

Task

- 4.b.1. Consider potential or additional uses of the reserve for science and education.

- 4.b.2. Consider the appropriateness of charging fees for some educational or scientific uses of the reserve and its facilities.
- 4.b.3. In coordination with the development of the Facilities Master Plan, develop protocols for managing remaining archeological or potential Native American sites.

Objective 4.c. Address personnel and policy needs identified in the Cooperative Plan for Watershed Conservation.

Task

- 4.c.1. As authorized by the Legislature, acquire key land parcels representing estuarine habitats typical of the South Slough watershed using Gustafson funds.
- 4.c.2. Identify additional parcels representing key habitat types that South Slough NERR may manage for watershed stewardship, education and research through partnership agreements that include the South Slough NERR.
- 4.c.3. Explore methods of allowing a third party organization, such as the Friends of South Slough, to own lands exhibiting key habitat characteristics and manage them on behalf of South Slough NERR.”

Objective 4.d. Maintain a Memorandum of Understanding with the Friends of South Slough, Inc., related to managing bookstore operations, visitor services, grant administration and finances and other activities.



Public Access & Facilities

South Slough National Estuarine Research Reserve
Management Plan



Chapter 8: Public Access & Facilities

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Public Access & Facilities



APRIL 2006

The purpose of public access and facilities operations at the South Slough NERR is to develop, build, and maintain facilities that advance the program goals of the reserve. Facilities at South Slough Reserve consist of all structures, utility and access roads, and trails located within the Reserve boundaries, along with related operations and maintenance equipment. In recent years, the Reserve has also developed facilities offsite to support its programs and operations.

During this planning period, South Slough NERR will focus on improving and building upon existing facilities and developing new facilities that strengthen the Reserve's connection with the community. The Reserve is scheduled to revise its *Facilities Master Plan* in 2006, which will describe the condition and use of existing facilities and the development of new facilities for the Reserve in greater detail than provided by this chapter.

Goals

The goals for South Slough NERR Public Access & Facilities for the next planning period are to:

- Goal 1. **Revise 1991 *Facilities Master Plan*.**
- Goal 2. **Develop and maintain facilities necessary to the operations of the Reserve and that support the needs of visitors and staff.**
- Goal 3. **Develop, maintain, and operate facilities that minimize environmental impacts and resource consumption by using innovative design, construction methods, and technologies.**

Background

In 1991, South Slough NERR developed a *Facilities Master Plan* to assess the condition and possible future uses of its buildings. The plan has guided the development of facilities for the Reserve and many of its recommendations have been implemented. Construction funds available to the Reserve from NOAA have supported the construction of several buildings and the renovation of others.

Existing Public Access and Facilities

This section reviews the existing building, trails, and roads at South Slough NERR. The condition of facilities will be assessed by the revised *Facilities Master Plan* and therefore will not be described here in great detail.

Buildings

Buildings at South Slough NERR provide offices, laboratory facilities, education and interpretive space, public areas, housing, maintenance and repair facilities, and storage space necessary to support the Reserve's programs and operations.

Interpretive Center

The 6,755 square-foot South Slough NERR Interpretive Center was constructed in stages starting in the mid-1980s and attained its present form in 2002. The wood-framed building is located along the west border of the Reserve, four miles south of Charleston. Interpretive materials and exhibits, a visitor services reception desk, and the Friends of South Slough bookstore occupy approximately 1,700 square feet of the Interpretive Center. A 1,500 square-foot lecture hall can accommodate 90 people and is designed for meetings, presentations, public programs, and portable exhibits. A 900 square-foot classroom provides additional space for hosting education activities. The building also includes a reception area, five offices and seven work stations, a staff meeting area, a copy room, a kitchen and staff common area, and storage.



*South Slough NERR
Interpretive Center*

Estuarine and Coastal Science Laboratory

Construction of the Estuarine and Coastal Science (ECOS) laboratory was completed in 1999 on the campus of the Oregon Institute of Marine Biology (OIMB) in Charleston. The Reserve established a cooperative agreement with the University of Oregon regarding the use, operation, and maintenance of the building (*see Appendix L*). The ECOS lab is the center of science programs for the Reserve. The 3,000 square-foot structure consists of five offices, laboratory space, and a meeting area. The building can accommodate up to ten staff, including graduate students and visiting researchers. The lab also includes staging and storage areas, a shower room, and a garage.

Maintenance Facility

A maintenance facility was constructed in 1999 to support the physical maintenance of Reserve property. The facility is located on the southwestern boundary of the Reserve, approximately one mile south of the Interpretive Center. The maintenance facility also includes a hazardous material storage shed and a pole barn with three bays for vehicles and boats. The gated yard provides additional storage area and security for boats, vehicles, and large maintenance equipment. The main building is 3,888 square-feet and consists of an office, a repair and fabrication shop, a three bay garage, and storage areas.

Spruce Ranch

The Spruce Ranch property is located adjacent to the maintenance facility and was purchased by the Reserve in 1999 to accommodate visiting researchers, volunteers, and interns working at the Reserve. The property includes a 1,680 square foot house, renovated in 2002. In 2004, two 24-foot diameter yurts were constructed on the property adjacent to the house to accommodate summer field crews and large research or education groups.

Fredrickson House

The ca. 1895 Fredrickson homestead is located by Wasson Creek and adjacent to a wetland restoration site at the southern end of the Reserve. Last inhabited in the 1970s, the house is now dilapidated and the target of repeated vandalism. The historic building is discussed in the 1991



Fredrickson House

Facilities Master Plan as a potential interpretive element. The structural integrity and interpretive potential the house will be reconsidered in the revised *Facilities Master Plan*.

Education Storage Shed

In 1997, the Reserve constructed a new shed for storage of props and materials used for education programs. The 120 square-foot shed, located near the shoreline of the estuary at the intersection of the Timber and Tunnel Trails, also serves as staging area for education programs and provides temporary storage for other projects.

Public Restrooms

In addition to the public restrooms available at the Interpretive Center, the Reserve constructed public restrooms near the end of the Tunnel Trail in 1994. The self-contained composting toilets in these restrooms minimize the impacts of the facility on the environment.

Trails

A system of trails at South Slough NERR provide visitors with access to the upland and estuarine areas of the Reserve and are essential to many educational activities. Trail surfaces are predominantly earthen, with wood chips or gravel used where necessary for safe travel. Trail development at the Reserve has been primarily guided by the 1990 *South Slough Watershed Walkway Plan*.

Ten-Minute Trail

This 0.2 mile loop trail, immediately adjacent to the Interpretive Center, emphasizes native plant identification. A portion of this trail is accessible to people with disabilities. Management issues include maintenance of the gravel trail surface and control of weedy and encroaching vegetation. Simple plant identification signs line the trail. This trail serves as a primary access point for elements of the Estuary Study Trail outlined below. Connecting spurs lead from this trail to the North Creek and Hidden Creek trails. A small amphitheater is located adjacent to the Ten-Minute Trail.

Estuary Study Trail System

Beginning in the uplands of the Reserve, this 3 mile multi-loop trail system is accessed from the Interpretive Center parking lot and follows the 75-acre Hidden Creek watershed along an easy to moderately challenging 300 feet descent to



Observation Deck



Ten-Minute Trail



Skunk cabbage boardwalk



Tunnel trail

the estuary. The lower portion of the trail is designed to be fully accessible for people with disabilities. A self-contained toilet is available at 1.5 miles down the trail.

- **Hidden Creek Trail**
This 1.15 mile trail segment leads from the Interpretive Center to the bottom of the Hidden Creek watershed. Management issues include erosion of the creek bank, bridge maintenance, and limited accessibility due to steep slopes.
- **Skunk Cabbage Boardwalk & Observation Deck**
The 643-foot-long cedar plank boardwalk begins at the foot of the Hidden Creek Trail and winds through fresh and salt water marshes to a 1,302 square foot observation platform. Maintenance issues include management of slip hazards and wildlife interactions, including elk and beaver.
- **Big Cedar Trail**
The Big Cedar Trail segment connects a parking area at the end of a special use trail access road with the Observation Platform and the Skunk Cabbage Walkway. This 0.4 mile trail was designed to be fully accessible with a combination of boardwalk and wide gravel trail surfaces and a relatively flat grade. The access road for this trail was recently paved and a remotely controlled electric gate was installed to improve accessibility. Visitors can check out an electronic key to open the gate at the Interpretive Center.
- **Tunnel Trail**
This 0.5 mile trail segment through dense understory shrubs connects the Marsh Observation Platform with the trail restrooms and Rhodes Dike.
- **Timber Trail**
This wide, gently sloping trail segment runs roughly parallel to the Tunnel Trail along an old railway grade and road, connecting the trail access road to the trail restrooms, Rhodes Dike, and the Tunnel Trail. Portions of this trail segment have a gravel surface.

North Creek Trail

In 2002, an AmeriCorps volunteer work crew began construction of the North Creek trail, and work on the trail has progressed with volunteer crews in 2003, 2004, and 2005. When completed, this trail will wind through upland

habitats to Rhodes Dike and will provide visitors with a new connection between the 10-Minute Trail and the other elements of the Estuary Study Trail System. The expected completion date is 2006.

Wasson Creek Trail

This trail passes through forest and freshwater marsh habitats in the southern portions of the Reserve. The trail is accessed via Hinch Road. It leads visitors past old logging railroad pilings and a view of the historic Fredrickson homestead. Maintenance issues include improving directional signage at the trailhead parking lot.

Water Trails

Public access to the estuary for paddle craft, such as canoes or kayaks, is available at the south end of the Reserve at Hinch Road Bridge. The Reserve plans to construct a paddle craft access point at this location, which is on the Winchester Arm of the slough. The paddle access point should be completed by the end of the 2006-2011 planning period.



Sloughside railroad pilings

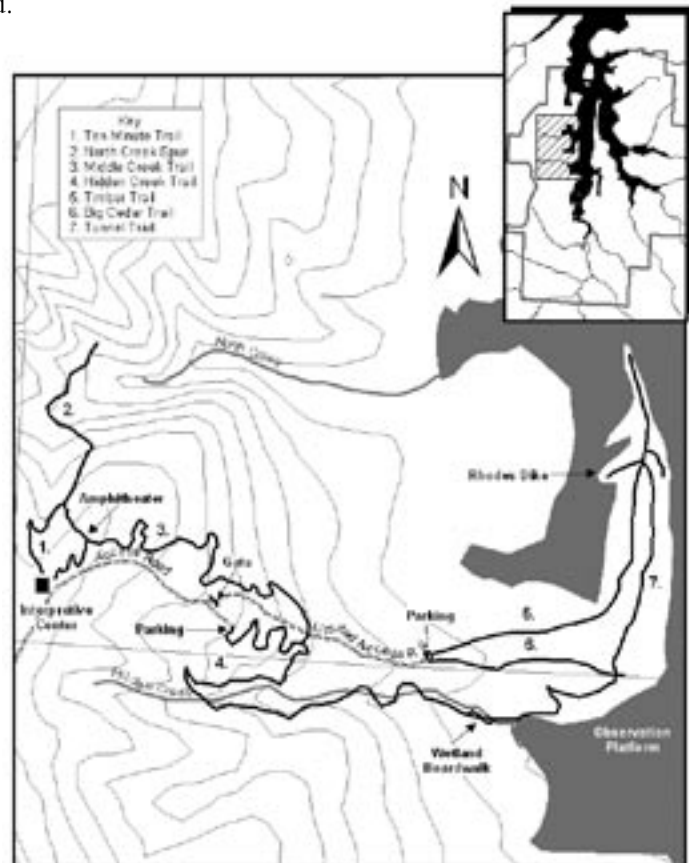
APRIL 2006

Roads and Parking

South Slough NERR maintains roads and parking to provide the public with access to the Reserve and facilitate the Reserve's programs and operations.

Interpretive Center Access Road

A 0.25 mile paved driveway provides access from Seven Devils Road to the South Slough NERR Interpretive Center and parking area. The main parking lot is paved and provides space for 16 vehicles, including one space that is reserved for persons with disabilities visitors. Parking for large buses and recreational vehicles is available in a graveled area adjacent to the main lot.



South Slough trail system



Tidal channel construction

Trail Access Road

A 0.5 mile spur road off of the Interpretive Center Access Road leads to the trailhead access for the Hidden Creek Trail. This road serves as one of two primary access points for the Estuary Study Trail System. Visitors can drive this short spur road to the small parking lot at the Hidden Creek trailhead. A steep branch of this spur road is equipped with a remotely operated gate. This road segment was paved in 2004 to control erosion and to provide improved access for persons with limited or restricted mobility, for education programs, and for Reserve maintenance.

Hinch Road

Hinch Road is the only improved vehicle access route to the southern portions of the Reserve, including the Wasson Creek Trail and the Winchester Creek paddle access point. This gravel road originates at Seven Devils Road, approximately one mile south of the main Reserve entrance. It leads steeply downhill to the more riverine portions of the estuary, and curves north through Reserve property. It is currently owned and maintained by Coos County.

Winchester Road

The Winchester Road is a 1,000 foot single-lane gravel spur connecting Hinch Road to a parking area for trail access to the Wasson Creek and Anderson Creek areas of the Reserve. In 2003, the majority of this road beyond the parking area was removed as part of the Anderson Creek habitat restoration. The remaining road is owned and maintained by the South Slough NERR. It also serves as a right-of-way for power lines that traverse the southern portion of the Reserve.

Facilities Development Policies

Facilities are created and operated to facilitate the implementation of South Slough NERR programs and achievement of Reserve goals. Facilities also serve a more subtle yet powerful role as physical expressions of the Reserve's values and priorities. Through choices in facility siting, design, and construction materials, South Slough NERR communicates its commitment to responsible ecosystem management.

The Reserve has developed the following policies to guide facility development:

Policies Applicable to all South Slough NERR Construction

- All facilities will, at a minimum, comply with the requirements of the Americans with Disabilities Act.
- Facilities and access routes will create minimum visual impact or view obstruction both within and beyond the Reserve's administrative boundaries.
- To the greatest extent possible, facilities will be designed and located to support multiple Reserve goals.
- Planning for any significant new facility will include representatives of groups expected to use or be affected by the facility, including South Slough NERR staff, volunteers, the general public, and local residents and business owners.
- Facility location factors will include consideration of impacts from increased site use, including transportation impacts, parking, and storm water, waste water and sewage disposal.
- Construction techniques shall be adapted for minimal environmental impacts, with particular attention to possible accelerated runoff, erosion, pollution (including vehicular), soil compaction, and energy issues.
- To the greatest possible extent, facilities and equipment planning and purchases will strive for energy efficiency and anticipate technological advances.
- Runoff from roads and parking lots will be directed whenever possible through an adequate vegetative filter prior to entering any water body.
- To the greatest possible extent, construction will occur in dry seasons to minimize soil erosion and compaction.



South Slough Interpretive Center

Policies Applicable to On-site Reserve Facilities

- Sites for all buildings and vehicular and pedestrian access routes will be consistent with South Slough NERR stewardship and land use planning.
- Only native plant species already found within the Reserve will be used in new plantings, with the exception of ornamental container plantings adjacent to Reserve buildings.
- Non-motorized conveyance will be considered and used whenever feasible for transport of materials to sensitive sites.
- The exterior of all built facilities will use rough textured, natural or natural-appearing materials and of a complementary color to those appearing in nature.
- Buildings will be unobtrusive in both site and form, preferring several small and clustered buildings (or that effect) to a monolithic appearance.

Policies Applicable to Off-site Reserve Facilities

- Consideration of off-site facility construction will be undertaken in close cooperation with the local community.
- Site determinations will encourage concentrated development pattern and be compatible with surrounding land uses.
- Site design will encourage pedestrian access.
- Design will be responsive to local architectural vernacular.

Policies Applicable to Trails

- Trails will be planned and designed to provide for visitors seeking solitude and quiet contemplation and for large groups.

- Trail construction and maintenance will make use of best available technical information and adopt techniques for minimal environmental impact.
- Trail construction crews created through the public involvement or other community participation programs will receive instruction in ecologically appropriate trail construction techniques.
- Trails which transect tidally-influenced areas and wetlands will be kept to a minimum; if any such trails are constructed, they will be elevated for least environmental impact, and sited for low visibility from the water and from other trails.
- Trail design will discourage shortcuts or other off-trail excursions by visitors.
- Consideration will be given to creating small group assembly areas adjacent to selected portions of some trails. These areas will be screened from trails and not visible from the water, and will allow groups to gather around a tour leader without trampling trail-side vegetation.
- Soil exposed for gathering places in the lower watershed will be protected from compaction and erosion.
- Trail names will refer to a trail's destination or to a natural feature or experience that occurs along or characterizes the trail.

Public Access

The Reserve's continuing policy, as expressed in the 1984 Management Plan, is to construct and maintain roads and trails only to the extent necessary to meet Reserve goals. Roads are necessary in some areas of the Reserve to provide trail access for some visitors, and for transporting large equipment needed by researchers and maintenance crews.

Roads and parking areas are associated with compacted soils, accelerated runoff rates, exacerbated erosion, and may disrupt

animal habitat and visitors' trail experiences. Gravel dumped into wetland soils for roads and parking alters percolation rates and vegetation patterns. Moreover, heavy metals and oil can be deposited on surfaces regularly used by motor vehicles, posing potential risk to the ecosystem.



South Slough NERR encourages natural and assisted revegetation of most of the old, non-maintained logging roads within its boundaries, and maintains strict limitations on areas for motorized vehicle use in the Reserve. Hiking trails are designed to encourage and promote pedestrian access, and with the exception of the fully accessible Big Cedar Trail, are off limits for any type of motorized transport. Hiking trails located on the Reserve are also not appropriate for equestrian or mountain bike traffic.



Public access to the estuary for paddle craft, is available on the south end of the Reserve near the Hinch Road Bridge. The Reserve plans to construct a purpose built paddle craft access facility at this location, which is the Winchester Arm of the slough. The canoe launch should be completed by the end of 2006.

The administrative rules of the Reserve generally allow motorized boat traffic within the boundaries in specified areas and with a controlled speed and wake.

Kunz Marsh restoration

Facilities Maintenance

Facilities at South Slough are maintained through the efforts of the Maintenance Foreman, a Maintenance Assistant, and occasional assistance from specialist contractors, seasonal staff and volunteer work crews. Temporary work crews focus primarily on trails, landscaping, and other outdoor projects.

With the completion of construction and renovation of the Interpretive Center, the Reserve's office and public use space doubled. This change has resulted in additional janitorial and maintenance needs. These needs will be closely monitored to determine if additional assistance (janitorial service, quarterly maintenance by outside contract, etc.) will be necessary. Reserve management will use the *Facilities Master Plan* revision to assist in the identification of specific needs in this area.

A primary responsibility of the Maintenance Assistant, a position only recently added to the staff of the Reserve, is upkeep of

the trail system. Trail maintenance includes aesthetic and accessibility projects, as well as ensuring that trail conditions are safe for visitors. Reserve staff are currently able to maintain trails at a minimum level due to staffing and other facility upkeep needs. Seasonal volunteer crews are recruited to assist with trail development and maintenance needs.

Reserve road maintenance is focused on erosion control and vegetation management. All current roads at South Slough NERR existed prior to the establishment of the Reserve, and most were designed primarily to meet logging needs. The combination of heavy rainfall, steep slopes, and erosive soils in the region has created gullies and deep puddles in unpaved roads. Culverts and roadside ditches have been installed in most problem areas. Roads adjacent to the Interpretive Center were paved in 2004 to reduce erosion and provide better emergency access. Staff routinely cut brush growing along roads in and adjacent to the Reserve as necessary to maintain sightlines and safety.

Accomplishments 1994-2004

- Removed four house structures and outbuildings to facilitate restoration efforts.
 - Kunz house
 - Tracy house
 - Winchester house
 - Fredrickson barn
- Discontinued use of the 0.75 mile long Winchester Creek loop trail that was adversely impacting the environment.
- Constructed approximately 2.25 miles of trail in accordance with the 1990 South Slough Watershed Walkway Plan.
 - North Creek – 1 mile
 - Wasson Creek – 0.75 mile
 - Big Cedar (persons with disabilities accessible) – 0.5 mile
- Increased the capacity of the Reserve's programs through facility construction and renovations.
 - Interpretive Center expansion and renovations
 - Auditorium
 - Classroom
 - Remodeled office space, restrooms and reception areas



Winchester Creek



Trail signs

- ECOS lab and offices
 - Maintenance facility
 - Education storage shed
 - Four trail bridges
 - Five teaching platforms
- Increased the capacity to maintain safe trails and facilities through the establishment of a limited duration Maintenance Assistant position.
 - Constructed a safe storage facility for hazardous and flammable materials.
 - Renovated the Spruce Ranch house and constructed two yurts on the premises to provide adequate housing for visiting researchers, trail crews, and education groups.
 - Provided improved safety and access to the Reserve for students and visitors through the development of trails, interpretive signs, and viewing platforms.

Needs

Over the course of this management plan, South Slough NERR will focus efforts on addressing the following facility and public access needs.

Maintenance and Replacement Schedule

New buildings require regular maintenance and older facilities, including trails, require major repairs and upgrades at specific intervals. The Reserve needs to develop a maintenance and repair schedule to ensure the longevity and safety of facilities. Such a schedule will include equipment upgrades and replacement. A maintenance and replacement schedule will enable management to adequately plan for budget and staff to accomplish maintenance tasks.

Plan for Existing and New Facilities

Over the past planning period, the 1991 *Facilities Master Plan* has guided development of facilities at South Slough NERR. This document has reached the end of its usefulness and the Reserve is in need of a new plan to provide future direction for the use and development of facilities to meet staff and visitor needs. With the recent construction of research and education

facilities, the Reserve will focus efforts on facilities that enhance communication and a connection with the local community.

Improved Access for Visitors and Students

Trail development has largely been guided by the 1990 *South Slough Watershed Walkway* plan. Most of the trail development outlined in this plan has been accomplished. Future trail development should be addressed in the revised *Facilities Master Plan*.

Within the Reserve, access to the water for education purposes and recreation is currently difficult. Improved paddle craft access at the south end of the Reserve is needed to provide protection for resources and to ensure visitor safety.

Plan for Facilities for the South End of the Reserve

The southern portion of the Reserve currently experiences relatively light visitor use but has been an area of intensive stewardship related activity. This area will be a focus for interpretive planning during the next planning period (*see Education chapter*). Revisions to the *Facilities Master Plan* will address the development of trails and structures for this area.

Reduce Costs of Operating Facilities

As the South Slough NERR expands its facilities and programs, the cost of operations increases. The Reserve needs to find ways to reduce the costs of operations through innovative facility design and the incorporation of energy oriented technologies.

Public Access and Facilities 2006

Direction for the development of public access and facilities during this planning period will largely be provided in a revised *Facilities Master Plan* for the Reserve. The following describes projects that have already been planned or funded.



Paddling in the slough

Revise Facilities Master Plan

Reserve staff will define goals and tasks for further development of facilities for the Reserve and will work with a contractor to revise the *Facilities Master Plan*.

Relocate Administrative Offices to Charleston

Work is underway to study relocating the administrative staff of South Slough NERR to a site within the community of Charleston.



On the trail at South Slough

Public Access Improvements

The Reserve will continue to seek assistance from seasonal field crews (*i.e., AmeriCorps*) to complete the work that has been started on the North Creek Trail. A plan has also been developed to design and construct paddle craft access points to provide better access to the water trails of the Reserve.

Action Plan for Public Access and Facilities

Goal 1. Revise the 1991 *Facilities Master Plan*.

Objective 1a. Identify goals and objectives for the development of South Slough NERR facilities with a focus on enhancing relationships with the local community.

Objective 1b. Hire a contractor to assist with the development of the new *Facilities Master Plan*.

Objective 1c. Develop a facility maintenance schedule for inclusion in the *Facilities Master Plan*.



South Slough NERR exhibit gallery

Goal 2. Develop and maintain facilities necessary to the operations of the Reserve and that support the needs of visitors and staff.

Objective 2a. Ensure that appropriate and efficient use is planned for all Reserve facilities.

Objective 2b. Implement a facility maintenance and upgrade schedule.

Objective 2c. Examine visitor trends and respond proactively to changing needs.

Objective 2d. Plan and budget fiscal resources to appropriately administer the revised Facilities Master Plan.

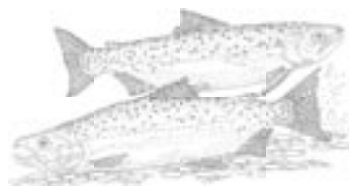
Goal 3. Develop, maintain, and operate facilities that minimize environmental impacts and resource consumption by using innovative design, construction methods, and technologies.

Objective 3a. Review and consider adopting sustainable design guidelines developed for the National Estuarine Research Reserve System in 2004.

Objective 3b. Seek and develop partnerships to support investments in energy efficiency and reinforce the principals of sustainability.



Deep water terminal at Charleston serves the fishing fleet



2006-2011

**South Slough National Estuarine
Research Reserve**

Management Plan
Appendices



**South Slough National Estuarine
Research Reserve**

*Management Plan
2006-2011*



Prepared by the staff of
South Slough National Estuarine
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Appendices

South Slough National Estuarine Research Reserve
Management Plan



Code of Federal Regulations

Title 15: Commerce and Foreign Trade

Part 921—National Estuarine Research Reserve System Regulations

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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 carried 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 pre-acquisition 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 D) 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 pre-acquisition 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 MOUs 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-than-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 Estuarine 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 MOUs 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 off-site 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.

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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 pre-acquisition, 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.

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. Lower Columbia (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 Demarcation Point.)

Insular

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

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 layer, 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 *Myrica*, *prunus*, and *Rosa*.

2. Southeast areas: Floral dominants include *Myrica*, *Baccharis*, and *Iles*.
3. Western areas: *Adenostoma*, *arcotyphlos*, 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 underlying 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 (*Gammaridae*), 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, dinoflagellates, filamentous 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 *Ascophyllum* at the mid-tidal level, and *Laminaria* and other kelp like 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 filamentous 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 as green algae with calcareous particles such as *Halimeda*, and numerous other green, red, and brown algae.

Group III—Submerged Bottoms

A. Subtidal hard bottoms. 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 hard bottom. 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 kelp, may also be found.

B. Subtidal soft bottoms. 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 shoreline.
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 shoreline.
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 benthic algae such as *Rhizoclonium*, the mineral encrusting *Schizothrix*, and the vascular plant *Ruppia maritima*. Characteristic fauna which exhibit a high degree of endemism, 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 sea 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 origin.

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 substrate, 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.

LAST UPDATED: FEBRUARY 18, 2004

<http://www.access.gpo.gov/nara/cfr/cfr-table-search.html>

Biogeographic Classification and Typology of National Estuarine Areas

The coastlines of the United States and its territories have been divided into the following areas based on their biologic and geographic characteristics:

Acadian

1. Northern Gulf of Maine (Eastport to 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. Northern Carolinas (Cape Hatteras to Santee River)
7. South Atlantic (Santee River to St. Johns River)
8. East Florida (St. Johns River to Cape Canaveral)

West Indian

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

Louisianan

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 Pt. Conception)
15. Central California (Pt. Conception to Cape Mendocino)
16. San Francisco Bay

Columbian

17. Lower Columbian (Cape Mendocino to Columbia River)
18. Washington Coast (Columbia R. to Vancouver Island)
19. Puget Sound

Great Lakes

- 20. Lake Superior, including St. Marys 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 Islands (Cook Inlet to Bristol Bay)

Sub-Arctic

- 26. Northern Alaska (Bristol Bay to Demarcation Point)

Insular

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



Oregon Revised Statutes (2005 Edition)

SOUTH SLOUGH ESTUARY

ORS 273.553 – SSNERR; agreement between Oregon and the federal government

- (1) It is the policy of the State of Oregon to maintain the South Slough of Coos Bay, from Valino Island southward, inclusive, as a national estuarine research reserve, acquired as the South Slough Estuary Sanctuary pursuant to chapter 415, Oregon Laws 1975, as the first estuarine sanctuary in the United States to be created under Section 312 of the Coastal Zone Management Act of 1972 (P.L. 92-583) and re-designated as the South Slough National Estuarine Research Reserve by federal law (P.L. 99-272). The management policy for the reserve is to:
 - (a) Maintain the integrity of the estuary;
 - (b) Protect the estuary from uses and activities, both within and beyond its boundaries, that may alter or affect the ecosystem and its natural dynamic processes; and
 - (c) Preserve the area for long-term scientific and educational uses.
- (2) Responsibility for completing purchase of the South Slough National Estuarine Research Reserve is vested with the Department of State Lands. The department acts for the State of Oregon in any transaction respecting the purchase of acreage for the reserve on or after October 4, 1977.
- (3) Except as necessary to achieve the policy set forth in subsection (1) of this section and any standards established in the Coastal Zone Management Act of 1972 (P.L. 92-583) or any rules, regulations or agreements adopted pursuant thereto, the reserve is open to the public. However, to protect the estuarine ecosystems, public use of the reserve may be limited and controlled by the South Slough National Estuarine Research Reserve Management Commission in consultation with any technical management team established pursuant to an agreement between the State of Oregon and the Office of Ocean and Coastal Resource Management of the National Oceanic and Atmospheric Administration of the United States Department of Commerce. The commission shall adopt rules to carry out the intent of this subsection.
- (4) The South Slough National Estuarine Research Reserve Management Commission shall administer the reserve, subject to any agreement respecting the reserve between the State of Oregon and the federal Office of Ocean and Coastal Resource Management.
- (5) The agency that acquired title to the reserve shall cause title to be cleared in the name of the State of Oregon.

O.R.S. 273.554 – SSNERR Management Commission; powers, membership, procedures, expenses

- C
- (1) For the purpose of providing for the administration of the South Slough National Estuarine Research Reserve in a manner consistent with the provisions of ORS 273.553, there is created the South Slough National Estuarine Research Reserve Management Commission. The commission shall have the authority, in accordance with the policies formulated by the State Land Board, to:
 - (a) Conduct the day-to-day operation and management of the South Slough National Estuarine Research Reserve with the administrative support of the Department of State Lands;
 - (b) Appoint a manager and other staff necessary to carry out this section; and
 - (c) Apply for, receive and expend moneys from the federal government and from this state or any agency thereof for the purpose of carrying out this section.
 - (2) In accordance with applicable provisions of ORS chapter 183, the commission may adopt rules necessary to:
 - (a) Carry out the commission's responsibilities pursuant to ORS 273.553; and
 - (b) Implement a system of fees to recover the costs of carrying out the management established in ORS 273.553, including fees for use of facilities at the reserve, fees for research activities conducted at the reserve, visitor activities fees and parking fees.
 - (3) The commission shall consist of nine members appointed by the Governor as follows:
 - (a) A representative of common schools in the area of the reserve;
 - (b) One authorized representative of the Coos County Board of Commissioners;
 - (c) One authorized representative of the governing body of the Port of Coos Bay;
 - (d) The Director of the Department of State Lands or a designee thereof;
 - (e) One authorized representative of the federal Office of Ocean and Coastal Resource Management;
 - (f) Two representatives with an interest in marine science, one from the University of Oregon Institute of Marine Biology at Charleston and one from Oregon State University;
 - (g) One member selected from the general public at large; and
 - (h) One representative of Oregon Indian Tribes appointed after consultation with the Commission on Indian Services.
 - (4) The members appointed by the Governor under subsection (3)(a), (f), (g) and (h) of this section shall serve for terms of four years and members appointed under subsection (3)(b) and (c) of this section shall serve for terms of two years. The Director of the Department of State Lands or the designee of the director, if appointed in place of the director, shall serve as the permanent chairperson of the commission. The commission shall select one of its members as vice chairperson. The chairperson and vice chairperson shall have duties and powers necessary for the performance of the functions of such offices as the commission determines. The vice chairperson shall act as the chairperson of the commission in the absence of the chairperson. The vice chairperson shall serve for a term of one year, subject to reelection by the commission.
 - (5) Each member of the commission shall have one vote, except that the member who is the authorized representative of the federal Office of Ocean and Coastal Resource Management shall

be a nonvoting member. A majority of the commission constitutes a quorum for the transaction of business.

- (6) Members of the commission are not entitled to compensation, but in the discretion of the State Land Board may be reimbursed for actual and necessary travel and other expenses incurred by them in the performance of their official duties, subject to laws regulating travel and other expenses of state officers and employees.

O.R.S. 273.555 [Formerly 273.210; 1967 c.421 para.16; renumbered 273.085]

O.R.S. 273.556 – Management Account

- (1) The South Slough National Estuarine Research Reserve Management Account is established within the Common School Fund. Except for moneys otherwise designated by statute, all moneys received by the South Slough National Estuarine Research Reserve Management Commission shall be paid into the State Treasury and credited to the account. All moneys in the account are appropriated continuously and shall be used by the commission for the purpose of carrying out ORS. Interest on moneys in the account shall be credited to the Common School Fund.
- (2) The commission shall keep a record of all moneys deposited in the account. The record shall indicate by separate cumulative accounts the source from which the moneys are derived and the individual activity or program against which each withdrawal is charged.
- (3) On the effective date of this 2005 Act, the South Slough National Estuarine Research Reserve Management Commission shall transfer all moneys contained in the South Slough National Estuarine Research Reserve Management Account established within the General Fund to the South Slough National Estuarine Research Reserve Management Account established within the Common School Fund.

O.R.S. 273.557 – Appeal to State Land Board

- (1) Jurisdiction for review of actions and proposed actions of the commission which are claimed to be in violation of any provision of ORS 273.553 or 273.554 is conferred upon the State Land Board. Proceedings for review of such actions may be instituted by filing a request for review with the State Land Board.
- (2) The request for review by the State Land Board need only state the action or proposed action of the commission in question and the particular provisions of ORS 273.553 or 273.554 which are violated thereby. Copies of the request for review shall be served by registered or certified mail upon the commission.
- (3) The State Land Board may affirm, reverse or modify the action under review and make such other disposition of the matter as it deems necessary to carry out the provisions of ORS 273.553 or 273.554. The State Land Board shall make its decision within 60 days after the date on which the request for review was filed.

O.R.S. 273.558 – Penalties; enforcement; injunctive relief

- (1) Violation of a rule adopted under ORS 273.553 (3) is a Class D violation for each day of violation.

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Oregon Administrative Rules contains rules filed through November 15, 2004

Department of State Lands South Slough National Estuarine Reserve

DIVISION 1 - Procedural Rules

142-001-0000

Notice of Proposed Rule

Prior to the adoption, amendment, repeal of any rule, the South Slough National Estuarine Research Reserve Management Commission shall give notice of the proposed adoption, amendment, or repeal:

- (1) In the Secretary of State's Bulletin referred to in ORS 183.360 at least fifteen (15) days prior to the effective date.
- (2) By mailing a copy of the Notice to persons on the Commission's mailing list established pursuant to ORS 183.335(6).
- (3) By submitting a copy of the Notice to all of the newspapers published in Coos County, Oregon.
- (4) By mailing a copy of the Notice to the Department of Fish and Wildlife, the Department of Environmental Quality, the State Forestry Department, and the Coos County Board of Commissioners.

Stat. Auth.: ORS 183 & ORS 273

Stats. Implemented: ORS 273

Hist.: SSES 1-1978, f. & ef. 11-2-78; SSNER 1-1998, f. & cert. ef. 7-15-98

142-001-0005

Model Rules of Procedure

Pursuant to ORS 183.341, the Division of State Lands and the State Land Board adopt the Attorney General's Model Rules of Procedure under the Administrative Procedures Act as amended October 3, 2001.

[ED. NOTE: The full text of the Attorney General's Model Rules of Procedure is available from the office of the Attorney General or the Division of State Lands, South Slough National Estuarine Reserve.]

Stat. Auth.: ORS 183 & ORS 273

Stats. Implemented: ORS 273

Hist.: SSES 2-1978, f. & ef. 12-1-78; SSES 1-1980, f. & ef. 12-23-80; SSES 1-1982, f. & ef. 2-25-82; SSES 1-1984, f. & ef. 3-30-84; SSNER 1-1998, f. & cert. ef. 7-15-98; SSNER 1-2002, f. & cert. ef. 7-12-02

The official copy of an Oregon Administrative Rule is contained in the Administrative Order filed at the Archives Division, 800 Summer St. NE, Salem, Oregon 97310. Any discrepancies with the published version are satisfied in favor of the Administrative Order. The Oregon Administrative Rules and the Oregon Bulletin are copyrighted by the Oregon Secretary of State.

The Oregon Administrative Rules contain OARs filed through November 15, 2004

Department of State Lands South Slough National Estuarine Reserve

DIVISION 5 - Research and Education Activities

142-005-0005

Notification of Research

Any person(s) planning to conduct research within the South Slough National Estuarine Research Reserve must submit a description of their proposed research no later than 30 days prior to the onset of the research project with their request for permission to conduct research. Written permission must be obtained from the Manager of SSNERR before initiating any research. The researcher(s) must also agree to submit a report of their findings to South Slough National Estuarine Research Reserve, no later than 6 months after the completion of field work.

Stat. Auth.: ORS 183 & ORS 273

Stats. Implemented: ORS 273

Hist.: SSNER 1-1998, f. & cert. ef. 7-15-98

142-005-0010

Temporary Structures

Temporary structures for research or educational purposes are permitted for the duration of the project.

Stat. Auth.: ORS 183 & ORS 273

Stats. Implemented: ORS 273

Hist.: SSNER 1-1998, f. & cert. ef. 7-15-98

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The Oregon Administrative Rules contain OARs filed through November 15, 2004

Department of State Lands South Slough National Estuarine Reserve

DIVISION 10 - Public Uses of the South Slough National Estuarine Research Reserve

142-010-0005

Purpose

These rules are designed to complement the primary management objectives and the primary scientific objectives of the South Slough National Estuarine Research Reserve by regulating public use of the Reserve. The primary management objective of the Reserve is to maintain the integrity of the estuary; to protect it from both internal and external sources of stress which may alter or affect the nature of the ecosystem and to preserve the area for long-term scientific and educational uses. All publicly owned areas of the Reserve are available to scientists, students and the general public on a basis desirable and permissible for coordinated research and educational uses and for other compatible uses to the extent they do not interfere with the primary management and scientific objectives. These rules are adopted in accordance with plans and policies defined in the South Slough National Estuarine Research Reserve Management Plan; Oregon Revised Statutes (ORS 273 .533 et seq.); the federal Grant-in-Aid (fi04-4-158-12001, as amended); and Section 315 of the Coastal Zone Management Act of 1972 as amended.

Stat. Auth.: ORS 273

Stats. Implemented: ORS 273

Hist.: SSES 2-1980, f. & ef. 12-23-80; SSES 2-1982, f. & ef. 3-2-82; SSNER 1-1998, f. & cert. ef. 7-15-98

142-010-0010

Definitions

As used in these rules, unless the context provides otherwise:

- (1) "Advisory Group" means the group of local interested persons and persons with special expertise in fields relating to the Reserve appointed by the Commission to advise the Commission.
- (2) "Commercial" refers to an activity undertaken for economic gain, as opposed to an activity for personal use or enjoyment.
- (3) "Commission" means the Management Commission of the South Slough National Estuarine Research Reserve created by ORS 273 .554.
- (4) "Manager" means the Manager of the South Slough National Estuarine Research Reserve appointed by the Commission.
- (5) "Public Use" means any use of the Reserve which is not a part of a formal Reserve educational or scientific program.

- (6) “Recreational” refers to an activity undertaken for personal enjoyment as opposed to economic gain.
- (7) “Reserve” means Sanctuary as defined in the Coastal Zone Management Act of 1972 which is the lands, within the boundary of the South Slough National Estuarine Research Reserve under the jurisdiction of the Commission, in which the State of Oregon has legal interest, including, but not limited to fee ownership, conservation easement, and/or life estate. ORS 273 .553(1) states, “...the South Slough Estuary Sanctuary pursuant to chapter 415, Oregon Laws 1975, as the first estuarine sanctuary in the United States...,” and the 1986 reauthorization of the Coastal Zone Management Act changed the name from Estuarine “Sanctuary” to National Estuarine Research Reserve. South Slough Estuarine Sanctuary is doing business as the South Slough National Estuarine Research Reserve for the purpose of day to day business.
- (8) “Forest Greenery” means plant material used for decorative purposes.
- (9) “OCZM grant” means the original NOAA Grant-in-Aid financial award.
- (10) “Stewardship” means activities conducted to maintain and restore the integrity and natural dynamic processes of an estuarine ecosystem.

Stat. Auth.: ORS 273

Stats. Implemented: ORS 273

Hist.: SSES 2-1980, f. & ef. 12-23-80; SSES 2-1982, f. & ef. 3-2-82; SSNER 1-1998, f. & cert. ef. 7-15-98

142-010-0015

Permitted Activities

Subject to action by the Commission taken under rules 142-010-0025 and 142-010-0030, the following noncommercial uses of the Reserve are permitted without special restrictions. State and federal regulations will govern these activities where applicable:

- (1) Canoeing and row boating;
- (2) Aesthetic appreciation;
- (3) Recreational fishing;
- (4) Hiking;
- (5) Wildlife observation.

Stat. Auth.: ORS 273

Stats. Implemented: ORS 273

Hist.: SSES 2-1980, f. & ef. 12-23-80; SSES 2-1982, f. & ef. 3-2-82; SSNER 1-1998, f. & cert. ef. 7-15-98

142-010-0020

Restricted Activities

The following public, noncommercial uses of the Reserve are permitted with restrictions, subject to action taken by the Commission under rules 142-010-0025, 142-010-0030 and other appropriate governmental agency regulations:

- (1) Picking of forest greenery for personal use is permitted only upon written approval by the Manager. The amount gathered should be no more than 10 pounds per day unless otherwise stated in the permit.

- (2) Overnight use of the Reserve is allowed only with written permission of the Manager.
- (3) Chemical fertilizers, herbicides, or pesticides will be used within the Reserve only if necessary to assure sound management of the ecosystem. Any allowed application of such chemicals shall be approved in writing by the Commission, after consultation with the Advisory Group, in accordance with best management practices so as to prevent direct application or discharge to the estuary waters. It is the intent of the Commission to preferentially utilize nonchemical management techniques of pest control. Chemicals will be utilized for pest or weed control only after it has been determined that the nature and integrity of the ecosystem is endangered.
- (4) Digging for artifacts is not permitted except as pursuant to ORS 273 .705 et seq. and with the written permission of the Commission.
- (5) Open fires are allowed only upon approval of the Reserve Manager.
- (6) Hunting is allowed only during authorized waterfowl and game hunting seasons, subject to Department of Fish and Wildlife regulations, except in specific areas where the Commission may prohibit hunting for the protection of the health, safety, and welfare of the public. Areas closed to hunting will be posted.
- (7) Hunting and Observation Blinds are allowed within the boundaries of the Reserve, but a blind must be taken down and removed from the Reserve at the end of each day.
- (8) Motorized boating is permitted except in special protection zones: areas excepted for public health, safety, and welfare, educational uses, and scientific research. Motorized boating will be at reduced speed that will limit the wake to less than a one foot wave height in order to prevent disturbance to the tidelands and wildlife habitats.
- (9) Construction of boat launch and tie-up facilities is permitted only as necessary for health, safety, research, or education.
- (10) Oyster culture is limited to the 100 acres as provided in the OCZM grant. The Commission shall recommend appropriate action on each oyster culture application or changes to existing plats within the Reserve to the Department of Agriculture.
- (11) Tree removal from Reserve lands may occur only with the approval of the Commission, after consultation with the Advisory Group, and only for the following reasons:
 - (a) Salvage of windthrow, dead, and dying trees;
 - (b) High risk to invasion of forest insects and diseases;
 - (c) Hazards to visiting public and scientists;
 - (d) Experimental and scientific projects;
 - (e) To maintain adequate clear space for existing powerline corridors;
 - (f) Thinning to maintain a healthy forest stand.
- (12) Firewood cutting for personal use requires a permit from the Reserve Manager.
- (13) Pets are permitted only if on a leash or under the direct control of the owner.
- (14) Recreational mineral gathering requires a permit from the Manager.

- (15) Horseback riding is permitted except in designated areas and not within any water course. Information about designated areas may be obtained at Reserve Headquarters.
- (16) Picnicking is permitted except in designated areas.
- (17) Recreational mushroom gathering, up to a maximum of one gallon per day, is permitted except in designated areas.
- (18) Recreational berry picking is permitted except in designated areas.
- (19) Recreational bait gathering is permitted except in designated areas subject to Oregon Department of Fish and Wildlife regulations.
- (20) Recreational clamming is permitted except in designated areas.
- (21) No dredging, filling or altering the natural environment except upon the approval of the proposed activities by the Commission.
- (22) Motorized off-road vehicles are prohibited except on designated county-maintained roads or driveways approved by the Commission.
- (23) Construction of roads is not allowed except by special permit issued by the Commission.
- (24) No deliberate introduction of a non-native species (or subspecies) within the Research Reserve's administrative boundaries without the prior approval of the Commission
- (25) Trapping within the Reserve's administrative boundaries is prohibited, except for research or management purposes, and then only with the approval of the Manager.
- (26) New or increased commercial activities which are not existing as of the creation of the Reserve in June 1974 must be approved by the Commission.

Stat. Auth.: ORS 273

Stats. Implemented: ORS 273

Hist.: SSES 2-1980, f. & ef. 12-23-80; SSES 2-1982, f. & ef. 3-2-82; SSNER 1-1998, f. & cert. ef. 7-15-98

142-010-0021

Prohibited Activities

The following uses of the Reserve are prohibited activities as determined by the Commission, by authority of ORS 273 .553(3):

- (1) Commercial bait gathering;
- (2) Commercial timber harvest;
- (3) Commercial mineral removal;
- (4) Discharge of firearms for pleasure shooting or for target practice;
- (5) Picking of forest greenery and cascara bark gathering for commercial purposes.

Stat. Auth.: ORS 273

Stats. Implemented: ORS 273

Hist.: SSES 2-1982, f. & ef. 3-2-82; SSNER 1-1998, f. & cert. ef. 7-15-98

142-010-0025

Public Health, Safety, and Welfare

The Manager is authorized to take actions necessary for maintaining public health, safety, and welfare. The Manager's actions under such authority shall be consistent with the primary objectives of the Reserve.

Stat. Auth.: ORS 273

Stats. Implemented: ORS 273

Hist.: SSES 2-1980, f. & ef. 12-23-80; SSES 2-1982, f. & ef. 3-2-82; SSNER 1-1998, f. & cert. ef. 7-15-98

142-010-0030

Temporary Closure

Any activity may be suspended or any area closed if necessary for the conduct of appropriate scientific research, stewardship and educational activities. Such closure will occur only after consultation with the Advisory Group, and with approval of the Commission. If, based on the scientific data and knowledge acquired and on scientific judgment, uses are found to have a detrimental or adverse impact, actual or potential, on the ecosystem or resources thereof, appropriate agencies of the State of Oregon shall take immediate action to control such uses so as to remove or negate their impacts and restore the system to its natural state as it was prior to such activities.

Stat. Auth.: ORS 273

Stats. Implemented: ORS 273

Hist.: SSES 2-1980, f. & ef. 12-23-80; SSES 2-1982, f. & ef. 3-2-82; SSNER 1-1998, f. & cert. ef. 7-15-98

142-010-0035

Roads and Trails

Roads and trails other than those authorized by the Commission will be closed. No roads or trails will be constructed without approval of the Commission. Access to Reserve lands shall be on authorized roads and trails only, and not through private property unless the state has acquired an easement.

Stat. Auth.: ORS 273

Stats. Implemented: ORS 273

Hist.: SSES 2-1980, f. & ef. 12-23-80; SSES 2-1982, f. & ef. 3-2-82; SSNER 1-1998, f. & cert. ef. 7-15-98

142-010-0040

Leases and Rentals

Any fee for a lease or rental approved by the Commission for any use of the Reserve lands or buildings shall be at fair market value.

Stat. Auth.: ORS 273

Stats. Implemented: ORS 273

Hist.: SSES 2-1980, f. & ef. 12-23-80; SSES 2-1982, f. & ef. 3-2-82; SSNER 1-1998, f. & cert. ef. 7-15-98

142-010-0045

Short-Term Use of Facilities

Overnight use of buildings and facilities is permitted upon approval by the Manager. Employee housing can be provided in a manner consistent with applicable policy governing use of state owned property by state employees (ORS 182.425 and 182.435).

Stat. Auth.: ORS 273

Stats. Implemented: ORS 273

Hist.: SSES 2-1980, f. & ef. 12-23-80; SSES 1-1985, f. & ef. 7-24-85; SSNER 1-1998, f. & cert. ef. 7-15-98

142-010-0050

Violation of Rules

Violation of these rules is punishable, upon conviction, by a fine of not more than \$100 for each day of violation, as set forth in ORS 273 .558. The Commission may appropriately appeal for injunctive relief and pursue civil remedies which require the rehabilitation or restoration of Reserve lands damaged in violation of these rules.

Stat. Auth.: ORS 273

Stats. Implemented: ORS 273

Hist.: SSES 2-1980, f. & ef. 12-23-80; SSES 2-1982, f. & ef. 3-2-82; SSNER 1-1998, f. & cert. ef. 7-15-98

142-010-0055

Review of Rules

ORS 273 .557 provides for State Land Board review of Commission rules. Individuals or organizations concerned about possible improper use or restriction of use of the Reserve may petition the State Land Board or the Office of Coastal Zone Management for review of the management program.

Stat. Auth.: ORS 273

Stats. Implemented: ORS 273

Hist.: SSES 2-1980, f. & ef. 12-23-80; SSES 2-1982, f. & ef. 3-2-82; SSNER 1-1998, f. & cert. ef. 7-15-98

142-010-0060

Amendment of Rules

These rules are subject to amendment by the Commission in accordance with the Attorney General's Model Rules of Administrative Procedure. Amended rules must be consistent with the policies of the Reserve Management Plan.

Stat. Auth.: ORS 273

Stats. Implemented: ORS 273

Hist.: SSES 2-1980, f. & ef. 12-23-80; SSES 2-1982, f. & ef. 3-2-82; SSNER 1-1998, f. & cert. ef. 7-15-98

The official copy of an Oregon Administrative Rule is contained in the Administrative Order filed at the Archives Division, 800 Summer St. NE, Salem, Oregon 97310. Any discrepancies with the published version are satisfied in favor of the Administrative Order. The Oregon Administrative Rules and the Oregon Bulletin are copyrighted by the Oregon Secretary of State.



Partnerships

South Slough NERR has entered into several partnerships at the local, regional, and national level that support joint projects and efforts. The following partners have been and will continue to be important to the mission of the Reserve:

- AmeriCorps (National Civilian Community Corps; Northwest Service Academy)
- Charleston Merchants Association
- City of Bandon
- City of Coos Bay
- City of North Bend
- Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians
- Coos Bay School District
- Coos County
- Coos Regional Trails Partnership
- Coos Watershed Association
- Coquille Indian Tribe
- Ducks Unlimited
- Friends of South Slough
- Menasha Foundation
- National Estuarine Research Reserve Association
- National Oceanic and Atmospheric Administration
- Northwest Aquatic and Marine Educators
- Northwest Youth Corps
- Oregon Coastal Environments Awareness Network
- Oregon Department of Agriculture
- Oregon Department of Environmental Quality
- Oregon Department of Fish and Wildlife
- Oregon Department of Forestry
- Oregon Department of Land Conservation and Development
- Oregon Department of Parks and Recreation
- Oregon International Port of Coos Bay
- Oregon State University
- Oregon State University Sea Grant
- Oregon Watershed Enhancement Board
- Oregon Wetlands Joint Venture



- Oregon Youth Conservation Corps
- Plum Creek Foundation
- Shoreline Education for Awareness
- South Coast Basket Weavers
- South Coast Business Enhancement Corporation
- Southwestern Oregon Community College
- SWOYA Boys and Girls Club
- Tillamook Bay National Estuary Program
- Trust for Public Lands
- University of Oregon/Oregon Institute of Marine Biology
- U.S. Army Corps of Engineers
- U.S. Bureau of Land Management
- U.S. Coast Guard
- U.S. Department of Agriculture
- U.S. Environmental Protection Agency
- U.S. Fish and Wildlife Service
- University of Washington
- Weyerhaeuser Corporation

Memorandum of Understanding Between Oregon Coastal Environments Awareness Network and Oregon Department of State Lands

South Slough National Estuarine Research Reserve Regarding the Coastal Environments Learning Network

I. BACKGROUND

Oregon Coastal Environments Awareness Network (OCEAN) is a non-profit organization that was formed in 1992 by a group of individuals representing industry, business, state and federal agencies, educators, and conservation organizations. OCEAN's goal is to promote awareness and understanding of the natural and cultural resources of Oregon's south coast and their management for both residents and visitors.

Since 1992, OCEAN has developed a clear mission statement, filed for incorporation, adopted bylaws, developed a seasonal Calendar of Events, implemented a membership and fee structure, and provided consultation services for a number of natural and cultural resource projects and programs in the area. Monthly meetings have served as an open forum for networking between constituents.

OCEAN also developed a five-year strategic plan. The plan provides a basis for coordinating a diversity of partners, programs, and projects important to a cross section of businesses, organizations, agencies and the public. The five major areas of focus identified in the plan, are: **networking, consultation, projects, training, and organizational development**. The plan is intended to provide guidance and direction to OCEAN while maintaining enough flexibility to take advantage of new opportunities, new partners, and new projects.

OCEAN's Coastal Environments Learning Network project (CELN) is the primary subject of this agreement.

According to the CELN Mission Statement:

The Coastal Environments Learning Network is dedicated to providing quality educational opportunities and outdoor experiences for residents and visitors to Oregon's south coast. It accomplishes this through a partnership of agencies, businesses, educators and individuals tied by a common interest in and reliance on the natural and cultural resources of the area, and by working together to explain and describe the natural processes, the land uses and management, and stewardship principles and practices.

The key objectives of this mission are:

1. To convey and promote an understanding and appreciation of how the coastal environment has, and continues to, influence and shape the plant, animal and human communities of the region and inspire sound, information based public stewardship attitudes and behaviors;
2. To contribute meaningfully to economic health of the area by providing new opportunities for institutional and citizen involvement in the Network's programs as well as other opportunities

to experience and learn about the south coast's exciting natural, scenic, recreational and cultural heritage.

The partnerships that comprise the CELN will facilitate the establishment of an integrated suite of coastal environment education programs and field trip experiences. The CELN, through published inventories of on-site facilities and of ongoing educational programs, and through formal cooperative agreements with participating site management agencies, will help ensure that logistics, coordination, and thematic consistency are provided to students, teachers, and tourists visiting the coast.

II. PURPOSE

This memorandum of Understanding (MOU) provides a framework for cooperation in planning, facilitating, and promoting programs and activities relating to the Coastal Environments Learning Network. The MOU will also specify the roles and responsibilities of cooperating parties. Such a cooperative arrangement will enhance educational opportunities, increase public participation, and provide coordination for regional planning. This MOU will strengthen the efforts of business and industry, public agencies, private organizations, and individuals to carry out OCEAN's mission and facilitate implementation of OCEAN's Coastal Environments Learning Network. It will also provide cooperating parties with the ability to take full advantage of other opportunities resulting from partnership with OCEAN as they arise.

III. AUTHORITY

This MOU is made and entered into by and among OCEAN and Oregon Division of State Lands: South Slough National Estuarine Research Reserve hereafter referred to as SSNERR.

OCEAN: A non-profit tax-exempt organization was incorporated in May of 1994. The organizational bylaws and five-year strategic plan provide the framework to enter into agreements with other interested parties.

IV. INTRODUCTION

The signatories to this agreement have responsibilities or interests in enhancing opportunities for all members of the public to learn about natural and cultural resources of the south coast, and to participate in educational activities and program. The parties agree that increased effort should be made to identify and publicize natural and cultural activities and programs; cooperate in developing programs and facilities; coordinate interpretive efforts; and provide a forum for information exchange.

In summary, it is the mutual belief of the signatories that implementation of the MOU will:

- Increase awareness, understanding, knowledge, and appreciation of resource management issues;
- Implement initiatives that are beyond the scope of individual participating partners;
- Promote coordination of activities;
- Promote long-term economic stability that is based in the resources of the area.

NOW, THEREFORE, in consideration of the above premises the parties agree as follows:

V. OCEAN SHALL:

1. Serve as a forum for exchange of ideas and information among diverse partners within the CELN.
2. Continue to work with SSNERR and other CELN partners in developing and conducting educational programs and other activities that are in keeping with the CELN Mission and Objectives.
3. Provide and/or support natural and cultural resource interpretation and education expertise to the public when appropriate.
4. Provide and/or support natural and cultural resource training opportunities for CELN partners when appropriate.
5. Assist in evaluating and monitoring the progress of ongoing CELN programs.
6. Assist CELN partners in public promotion of CELN and its programs
7. Continue to coordinate efforts to secure funding and other support for the CELN.
8. Support CELN partners in fund-raising initiatives that are consistent with OCEAN's mission and the mission of the CELN.

VI. SSNERR SHALL:

1. Collaborate with other CELN partners to realize CELN's Mission and Key Objectives as presented above.
2. Participate in planning, development and implementation of agreed upon CELN programs and projects in accordance with SSNERR policy
3. Designate a representative who will attend CELN program planning and development meetings and, when appropriate and necessary, OCEAN Board meetings. It is understood that at times the representative will be working with other collaborating Network partners in coordinating and integrating CELN programs and other activities.
4. Designate one or more locales, under SSNERR jurisdiction, as participating Network site(s) in the CELN.
5. Continue to maintain and, if deemed appropriate and feasible by the managing Organization, to improve the facilities, accessibility, and educational programming previously delineated in inventories of those CELN sites under SSNERR management.
6. Enter into program or project-specific agreements, or other appropriate agreements, where needed to accomplish agreed upon work.
7. Acknowledge OCEAN and other participating partners in media releases, at events, and in printed matter associated with cooperative programs and projects.
8. Support CELN partners in fund-raising initiatives that are consistent with SSNERR policy and with the mission of the CELN.

VII. IT IS MUTUALLY AGREED AND UNDERSTOOD BY AND AMONG THE SAID PARTIES THAT:

1. This agreement in no way restricts the cooperating parties from participating with other public and private agencies, organizations, and individuals; or from accepting contributions and gifts for the development, administration, and cooperation for similar activities.

2. Nothing in this agreement shall be construed as obligating SSNERR to expend funds, provide resources, contract for, or otherwise commit to the future payment of money, except wherein provided by separate agreement as per this MOU.
3. This agreement may be revised as necessary by mutual consent of both parties and by the issuance of a written amendment signed and dated by both parties.
4. Either party may terminate participation under this agreement by providing 60 days written notice. Unless terminated by written notice from either party, this agreement will remain intact for a period of five years but may be extended by cooperating parties.

VIII. SIGNATURES AND EFFECTIVE DATE:

In Witness Whereof, the parties hereto have executed this agreement as of the last written date below.

OREGON DIVISION OF STATE LANDS

SOUTH SLOUGH NATIONAL ESTUARINE RESEARCH RESERVE

Title:

Date

OREGON COASTAL ENVIRONMENTS AWARENESS NETWORK (OCEAN)

Title:

Date

January 15, 1997

OCEAN Board of Directors
P.O. Box 1771
Coos Bay, Oregon 97420

On behalf of the South Slough Management Commission, I would like to offer the following letter of commitment concerning the participation of the South Slough National Estuarine Research Reserve (SSNERR) as a partner in the efforts of the OCEAN organization. The South Slough Management Commission recognizes that OCEAN is a partnership organization and relies on the participation and contributions of members to successfully advance initiatives beyond the scope of participating individuals and agencies. Through the course of this letter, we would like to articulate the nature of South Slough's commitment to the process OCEAN's membership is undertaking.

It is our understanding that members of the South Slough Reserve staff have participated in OCEAN since its inception, and that many elements of OCEAN's mission are closely aligned with those of the Reserve. In particular, the statement to:

“Increase awareness, understanding, knowledge, and appreciation of resource management issues...” (OCEAN, Five Year Business Plan) is well matched to the South Slough NERR Education program mission to:

“Increase awareness, understanding, and appreciation of estuarine systems and estuarine stewardship by facilitating access to information about estuarine systems, and by providing opportunities for personal experiences with them.”

The broad and varied nature of OCEAN membership, both geographically and organizationally, has benefited South Slough in achieving a bio-regional scope to its program offerings. Furthermore, collaborative initiatives such as the Coastal Environments Learning Center and Network may be realized because of the existence of an organization such as OCEAN.

Because of these joint interests, South Slough staff has assisted OCEAN with project development and execution, activity coordination, fund-raising, in-kind contributions of equipment, personnel and technical expertise as well as providing membership dues.

The South Slough Commission would like to pledge a continued commitment in the aforementioned areas for the purposes of furthering the goals of the Reserve where they coincide with those of OCEAN. In particular, we would like to designate Reserve Manager, Mike Graybill as the primary representative to the OCEAN board with the continued participation of Education Program Coordinator Tom Gaskill in the projects and activities of OCEAN.

As the Coastal Environments Learning Center and Network concept continues to grow and develop, we would like to see the continued participation of OCEAN in the next phases. Additionally, I would like to see the continued recognition of South Slough Reserve as an active participant in OCEAN's projects and program offerings.

In closing, we would like to reiterate the South Slough Commission's support for the goals and mission of OCEAN and congratulate OCEAN on its accomplishments to date.

Sincerely,

Paul Cleary
Oregon Division of State Lands, Director
South Slough Management Commission, Chair



Publications & Reports

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- Miller, B.A. and S. Sadro. 2003. Residence time and seasonal movements of juvenile coho in the stream/estuary ecotone of Winchester Creek, South Slough. *Transactions of the American Society of Fisheries* 132:546-559.
- Rumrill, S.S. and V.K. Poulton. 2003. Ecological role and potential impacts of molluscan shellfish culture in the estuarine environment of Humboldt Bay, CA. Western Regional Aquaculture Center Annual Report, University of Washington. 33 pp.
- Thom, R.M., A.B. Borde, S.S. Rumrill, D.L. Woodruff, J.A. Southard, and S.L. Sergeant. 2003. Factors influencing spatial and annual variability in eelgrass (*Zostera marina* L.) meadows in Willipa Bay, Washington, and Coos Bay, Oregon, estuaries. *Estuaries* 26 (4B):1117-1129.
- Cornu, C.E. and S. Sadro. 2002. Physical and functional responses to experimental marsh surface elevation manipulation in Coos Bay's South Slough. *Restoration Ecology* 10:474-486.
- Rumrill, S.S. 2002. The Ecology of the South Slough Estuary: Site Profile of the South Slough National Estuarine Research Reserve (Review Draft). NOAA-OR Dept. of State Lands. pp 126.
- Wasson, K., D. Lohrer, M. Crawford, and S. Rumrill. 2002. Non-native species in our nation's estuaries; a framework for an invasion monitoring program. NOAA/NOS/NERRS Technical Report Series. pp 1-57.
- Roegner, C., D. Armstrong, B. Dumbauld K. Feldman, D. Gunderson, B. Hickey, C. Rooper, J. Resnick, S. Rumrill, and R. Thom. 2001. Biophysical dynamics in Pacific northwest estuaries. Pacific Northwest Coastal Ecosystems Regional Study (PNCERS) Annual Report, NOAA-OR Dept. of Land Conservation and Development. pp 40-57.
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- Rumrill, S.S. and M. Scalici. 1997. Estuarine morphodynamics and fish communities within Winchester Creek tidal channel: South Slough National Estuarine Research Reserve, Oregon. NOAA/SRD No. NA47-ORO-455 Final Report. pp 22.

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- Rumrill, S.S. and C.E. Cornu. 1995. Sough Slough coastal watershed restoration: a case study in integrated ecosystem restoration. *Restoration and Management Notes* 13:53-57.
- Rumrill, S.S. 1994. Non-point source pollution research and monitoring within the National Estuarine Research Reserve System. Proc. Coastal Non-Point Source Workshop, Building Partnerships, U.S. Environmental Protection Agency. pp 11-17.

South Slough NERR Stewardship Units

Natural Aquatic (NA) Management Unit

Description

The NA unit consists of all tidally submerged and submersible lands excluding the aquatic areas below the privately-owned uplands within the sanctuary (Figure 12). The NA unit consists of approximately 600 acres of lands between the sanctuary north boundary and the sanctuary south boundary across Winchester Creek. The east-west extent of this unit is determined by the heads of tide in Day, Elliot, Talbot and John B. Creeks in the east arm of South Slough; and in the south by the heads of tide in Cox Canyon, Theodore Johnson and Wasson Creeks.

General Characteristics

Access. The only boat access to the estuary from public roads within the sanctuary is at the county bridge on Hinch Road during mid to high tides by skiff or canoe and by canoe only at low tides. Motor boat access is from South Slough outside of the north boundary of the sanctuary. Motor boat access to land portions of the sanctuary is limited to Valino Island and the end of Long Island Point at low tide levels, and the rest of the shorelands at high tide level.

Past and Present Uses. From 1850 to about 1940 the slough provided the only transportation link to the rest of Coos Bay for the people of South Slough. All goods and travelers were either barged, floated or piloted on the slough. The slough was dredged along the length of the west arm to facilitate log rafting. Traditional uses have also included fishing, hunting and some clamming. Tidal wetlands have been diked to provide domestic animal pasturage although only two areas remain functionally diked today. The Indian use of the South Slough was apparently considerable in pre-historic times. Recent use of the slough has been mainly for recreational uses, at least in the sanctuary area.

Structures. Most of the functional structures in this unit are located in the Winchester Creek area. These structures include dikes with tide gates, a county bridge with pilings and retaining walls, and remnants of log raft tiedown pilings. One major dike system is located in the Elliot Creek area in the east arm of South Slough. A portion of mudflat and the creek draining into it has been diked and open to tidal flushing only through a culvert in the dike. All other dikes are well breached and the areas behind them recovering or apparently recovered from the Biking activity. There are no docks present in this unit.

Special Values

The NA unit gives one the feeling of being with nature; in fact, one initial acquisition criteria was that the sanctuary should constitute a visual unit, and the acquisition of property to date has been true to that ideal. The configuration of the landforms shaping the estuary gives visitors the impression of

protection due to the limited viewing distances. At high tides, the estuary appears to be a lake while at low tide the estuary appears as mainly mudflats with a very small amount of water confined to shallow channels. The predominant bottom sediment type is coarse to fine mud with a very small amount of sandy substrate around Valino Island. The water appears dirty due to suspended clays and silts, and the high content of living (plankton) and non-living organic materials suspended in the water. The productivity of the estuary is high as evidenced in part by the production of macroalgae and eelgrass. All major saltmarshes in South Slough are located within the boundaries of the sanctuary, adding to the primary productivity of the macroalgae and eelgrass. Secondary productivity is high due to the extensive beds of mud shrimp, ghost shrimp and clams, especially soft shell and bent-nosed clams.

Of particular note is the presence of approximately 100 acres of commercial oyster cultures. While a continuation of an historical activity, the presence of commercial oyster culture raises important questions in light of sanctuary goals. These questions are related to several factors: 1) oyster beds alter water flow in their immediate vicinity; 2) they potentially restrict public boat navigation at certain tide levels; 3) oyster species native to the Coos Bay Estuary are no longer found, the commercial species have been introduced; and 4) oyster beds may constitute a major biological influence in terms of their filterfeeding activity. Oyster plat lease certificates have addressed some of these issues, such as marking of plat locations, providing navigation channels, and keeping plat sections free of oysters for research purposes.

Oyster culture activity does provide a somewhat unique opportunity for scientific research in the SSNES, with a potential for controlled experiments designed to quantify the relationships between oyster culturing and estuarine systems.

Unit Management Plan

Phase I: Present to June 1985. A mudflat study station will be constructed in the vicinity of the Estuary Study Trail to permit students participating in the Estuary Study Program to take samples and other measurements of the mud and waters of the slough (see Section VI.C). Non-motorized boating will continue to be encouraged as a means of sanctuary water access and to make the estuary available for research.

During this period, scientific programs will be initiated to: 1) determine the present conditions and values of all diked sanctuary property and the Elliot Creek diked area; 2) collect information pertinent to an assessment of oyster culture influences in sanctuary waters; and 3) determine existing environmental baseline conditions and recommend appropriate monitoring programs.

Phase II: July 1985 to June 1989. Depending on the results of the the Phase I studies, corrective action may be instituted to return diked areas to full tidal influence. Such action, if taken, will be guided by specific management goals. Treatment areas will continue to be studied during this phase to determine how closely management goals are achieved and the final set of management, wildlife or habitat values achieved by the actions taken.

Oyster culture influences on the environmental quality and natural values of the NA unit will be assessed in order to satisfy the goals of the federal Grant-in-Aid and appropriate state statutes. Monitoring and research programs will be established as recommended in the environmental baseline report.

Phase III: July 1989 - Beyond. The general goal of NA unit management is to meet the broad goals of the National Estuarine Sanctuary Program, i.e., to utilize the South Slough estuary for research, education and low-intensity recreational purposes. At the minimum, future management of this unit will be to protect and preserve the estuary for long-term scientific and educational use. Long-term research and monitoring designed to increase our knowledge of estuaries will be a key part of future NA unit management.

Sanctuary(S) Management Unit

Description

This management unit is the basic sanctuary area exclusive of estuarine tidal and subtidal areas (Figure 12). Tidal and subtidal areas have been identified separately as the Natural Aquatic (NA) unit to conform with the County Comprehensive Plan since both the sanctuary and county management classification systems are parallel. The basic sanctuary uplands area may therefore be described as all sanctuary property not identified as being under Limited Development (LD), Special Protection (SP), Natural Aquatic (NA) or Private Ownership (PO). Unit S is bounded on the north by the northern sanctuary boundary, on the east by the eastern sanctuary boundary, on the south by private property and management unit LD 1, and on the west by Seven Devils Road. Unit S is presently composed of about 4,327 acres or about 95% of the SSNES area.

General Characteristics

Access. Unit S, until 1983, was separated into two areas (east and west with no state-owned land connecting them. The 511.17 acres of property previously owned by Moore-Oregon, which split the sanctuary in two parts, has since been acquired by the Oregon State Land Board (see Figure 8). After necessary timber values have been determined, Tier III sanctuary lands along the east side of the sanctuary will be traded for this property. The present east boundary of the sanctuary will then be redrawn to place the State Land Board property outside of the sanctuary. In return, the Moore-Oregon property will complete the blocking of the sanctuary lands into one contiguous unit.

All public access to Unit S lands is from publicly dedicated roads. On the west, paved Seven Devils Road and graveled Hinch Road, both county publicly dedicated roads, provide access. Hinch Road crosses the South Slough and a few hundred feet east of the county bridge terminates as a maintained road, but continues another 1/4 mile or so as an old, rutted, unmaintained road into the base of Long Island Point (at the site of a former schoolhouse). From there an old logging road provides hiking access toward the north onto Long Island Point and toward the east and northeast by a second series of old logging roads. All unmaintained roads are for foot traffic only except vehicular traffic for management purposes. Access onto unmaintained roads will be physically limited by barriers or gates, and signs placed to notify the public of non-motor vehicle access areas. On Unit S lands on the east side of the South Slough, visitor access is by hiking or on horseback and a signed trail system is being developed as proposed in the education section of this plan. Use of this trail is at the visitor's risk because hunting and other recreational uses are permitted along the eastside trail. The northern areas of Unit S lands are accessible by boat at all tidal heights and the southern areas by canoe at all tidal heights. A recently improved logging road which loops across the sanctuary boundary has been constructed by a private logging company (Figure 10, access points E and F). This road will

continue to be available for motorized vehicle use because it is a maintained road. Access by the public, however, will be at the discretion of adjacent property owners since no public access across sanctuary lands will be available.

Past and Present Uses. The past uses of these lands are those historical uses found in any coastal area of Oregon. Logging, homesteading and agricultural activities have all occurred on these lands in the past. At the time of sanctuary formation a variety of recreational pursuits and logging were major activities. Another major activity was the picking of plant materials for sale to wholesale suppliers of botanicals for florist shops. Called “brush picking”, this activity remains a major commercial industry in the Pacific Northwest. The materials picked include fern fronds, cedar boughs and the leaves and branches of other species. A second major activity concerning the gathering of botanicals is the harvesting of cascara tree bark, for the extraction of a natural laxative for the pharmaceutical industry.

Structures. There are no buildings on Unit S lands. Structures associated with the eastside access trail will be kept simple and to a minimum to reduce future maintenance costs. Directional signage will be provided for public convenience and safety and informational materials near the end of Hinch Road will also be provided.

Special Values

The outstanding characteristic of this unit is the feeling of being with nature. This is due to the lack of any development except the old logging roads, now mostly overgrown. Many of the tributaries support large populations of beaver and good runs of coho salmon and cutthroat trout. The upland habitats support large bird populations and provide cover for deer, elk, bear and other mammals. Small lakes and wetlands dot the drainages along the east side. The forests have all been clear cut within the past 20 to 30 years so that the vegetational patterns are a mosaic of successional stages ranging from areas replanted at commercial densities with Douglas fir in 1977 to areas of mixed fir, cedar and hemlock forests resulting from unplanted clear cutting about 40 years ago.

Unit Management Plan

Phase I: Present to June 1985. Unit S management actions have concentrated on reducing consumptive uses of the area since acquisition of this property. All domestic animal grazing has been stopped. Efforts have been made to physically block old roads at the sanctuary boundary to permit the natural revegetation of old roadbeds. Plantings and anti-erosion structures have been placed in some areas as resources permitted. Future actions are intended to simply permit this unit to proceed at a natural rate of recovery from past human impacts. Some accessibility will be provided but kept to a minimum in order to maintain the area in as natural and untrammelled a condition as possible. This will be accomplished by:

- Revegetation or constructing anti-erosion devices on old roadbeds where erosion is occurring
- Construction of a main equestrian and hiking trail
- Maintenance of signage for providing the public with directional and user information

Research will be initiated to assess rates of biological recovery from past human impacts and to further define the ecological values of Unit S 1 lands.

Phase II: July 1985 to June 1989. Information will be available ‘on visitor use of the equestrian and hiking trails and from biological recovery and ecological value studies. With this information, improve-

ments will be made to the trail system and actions to enhance the recovery of selected Unit S areas can begin. The specific details of these actions will require the gathering of information during the first phase.

Phase III: July 1989 - Beyond. The primary management strategy for Unit S land is to provide naturally evolving conditions for the purposes of supporting research, education and low-intensity recreational activities. No developments, other than the trails mentioned above, are projected for Unit S lands.

Special Protection 1(SP1) Management Unit

Description

Valino Island constitutes SP1 (Figure 12). This management unit is one of two that have been identified as portions of the primary sanctuary area having special management needs or special characteristics. Valino Island is located immediately south of the north boundary of the sanctuary. It is about 23 acres in area and so constitutes about one half of one percent of the sanctuary as presently formed.

General Characteristics

Access. Access is by boat at all tidal heights. Visitor use of this area is at their own risk and on a strictly nonconsumptive and day use only basis.

Past Uses. There is no indication that Valino Island had particular significance to the Indians of this area. The European settlers used the island rather extensively, mainly as a result of water transportation on the slough since the settlement of the region. At one time, a saloon called the Jolly Pig was located on the island. Other uses have included homesteading and, most recently, growing flower bulbs for resale by a local florist. The island has been logged. Camping and duck hunting from its shores have also occurred.

Structures. No structures exist on the island.

Special Values

From the water the casual visitor perceives Valino Island as merely an extension of the eastern shore. The knowledgeable visitor and the sanctuary staff view Valino Island as a particularly significant part of the sanctuary because it is the only island in the Coos Bay Estuary vegetated by forest species typical of the region. From the management perspective, Valino Island is a consolidated dune landform as are the adjacent shorelands, both east, northeast, west, southwest and northwest of it. These landforms apparently account for the sandy benthic estuarine habitats in this portion of South Slough. The rapid erosion along the west side is apparently creating a deposited benthic sand habitat, a habitat of limited availability in the sanctuary. Unique to the island, and indeed unique to most of the country, is a group of mature, healthy American Chestnut trees. This species, native to eastern North America, once formed vast eastern forests, but very few living and even fewer healthy trees remain since the introduction of a tree blight to which it had no resistance.

Unit Management Plan

Phase I: Present to June 1985. No action has been or is expected to be taken in this unit except to make it available for research. Efforts already initiated will continue to determine the rates of erosion of this landform, and if possible, the fate of the eroded materials. The eroded bluffs located in the portion of Unit S to the southwest of the island will also be investigated at the same time. During this information gathering phase, the only management actions anticipated will be to leave trees and other vegetative material in place that may have toppled onto the beach from the bluffs. This may provide some protection from further erosion.

Phase II: July 1985 to June 1989. During this period, management actions based on the knowledge gained in the first phase may be initiated. The nature and extent of these actions remain to be determined.

Phase III: July 1989 - Beyond. The management intent for this unit is to protect the resource to the extent possible commensurate with leaving its relationship with adjacent areas essentially unchanged. The most likely long-term management for this unit is to keep all use of the property to the lowest possible level and let the landform stabilize unimpeded by further environmental impact to it.

Special Protection 2 (SP2) Management Unit

Description

SP2 consists of the end of the peninsula known as Long Island Point (Figure 12). It is bounded on the west, north and east by the South Slough and on the south by portions of management unit S. SP2 is approximately 117 acres, or about 2.7 percent of the sanctuary as presently constituted.

General Characteristics

Access. Public access is presently available by boat at all tide heights. Since completion of the acquisition of the Land Board property, as explained for management unit S, hiking access along old logging roads is available. Due to the nature of the topography of the area few special provisions will be needed to make this area available for foot traffic.

Past Uses. All past uses of this unit have been either logging or very low-intensity recreation.

Structures. No structures presently exist in the unit. Special Values

The northernmost tip of the peninsula forming Long Island Point is extremely narrow and therefore in a delicate balance between stability and erosion. The narrow tip is forested with mature trees that constitute the largest contiguous stand of mature trees in the sanctuary. The broad southern portion of this unit has been clearcut within the past eight years. The special protection of this unit will help assure that the dominant landform feature responsible for creating the sanctuary estuarine areas as they exist today will be given appropriate protection.

Unit Management Plan

Phase I: Present to June 1985. No action has been taken or is expected to be taken in this unit except to make it available for research. Visitor use of this unit is at their own risk and on a strictly nonconsumptive and day use only basis.

Phase II: July 1985 to June 1989. Same as for Phase I.

Phase III: July 1989 - Beyond. The management intent for this unit is to protect the resource to the extent possible.

Limited Development 1 (LD1) Management Unit

Description

This unit is bounded on the north by Hinch Road, on the east by Winchester Creek and private property, on the south and west by the sanctuary boundary (Figure 12). LD1 consists of 400 acres and is about 9.3 percent of the sanctuary as presently constituted.

General Characteristics

Access. Primary access to the unit is by paved county road, Seven Devils Road, and a gravelled county road, Hinch Road. Access onto the site is by a former farm road not publicly dedicated. Boat access into the unit is provided by Winchester Creek during high tides. Two hiking access trails have been constructed on this site as described in a following section.

Past Uses. Past uses of this unit include homesteads and agricultural activities associated with the homesteads. Logging of the forested lands has also occurred at various times in the past. Agricultural uses have included clearing of the bottomlands for crops such as potatoes and for growing grass for hay and grazing purposes. The wetlands of the area have also been grazed as recently as 1977. Hunting and fishing activities were engaged in by past property owners, but not by the general public due to the homesteads and domestic animals present. All of the South Slough' has been a traditional use area for local Indian tribes. An historical burial site is located in the unit. Prehistoric sites may also be present.

Structures. LD1 contained all developed structures purchased by the sanctuary. Initially, these structures included three houses, two barns and a number of fences and sheds. Most of the farm structures were in an unsafe condition and two of the homes had septic systems badly in need of repair. Since being acquired, all fences and unsafe structures have been removed. At the present time the unit supports two houses; one is a split level home used as an office, tool storage area, interpretive center and overnight housing facility. The other is a circa 1906 two-story home presently empty and partially remodeled to repair age-damaged portions. The two-story house has no septic system. Outbuildings remaining are a recently constructed barn with cement floor, an old but usable shed used for storage and a pump house and storage tank supplying water to the office. All other buildings have been removed. A series of crude but usable farm bridges span the three creeks in the unit. Two visitor access trails have been developed using these bridges. One, Winchester Creek trail, is about 2,800 feet long in a loop configuration providing access to a wet meadow (or surge marsh) typical of upper slough areas. This trail also consists of a number of specially constructed foot bridges over wet areas. The second trail is an upland trail about 3/4 mile long. It accesses a tributary creek to the tidal portion of South Slough and a cleared valley. Old farm bridges are used on this trail system. All utility lines into the upper portion of South Slough pass through this unit. In addition to the sanctuary, three private properties are serviced by Coos-Currey Electric Coop lines passing through the unit. All lines are above ground.

Special Values

A primary characteristic of this unit is the open space provided by the cleared lands and the wetlands adjacent to Winchester Creek. The former impression of farmlands has been greatly reduced by the removal of buildings, fences and the associated farming activities. These open lands are the only open space areas in the sanctuary accessible from public roads. The open space also provides grazing areas for deer and elk herds. White-tailed kites and other raptors, and bobcats hunt the old fields for the rodents typical of tall grasslands. The forested valley slopes stabilize the steep hillsides and provide transition habitat. The unit characteristics are a direct result of past human activities. From the sanctuary viewpoint, the site provides opportunities for visitors to view wildlife due to the open space and the grasslands present. The broad, level valley floors provide a terrain easily developed into trail systems usable by all but wheelchair-bound visitors and even handicapped trails could be developed here. Although the habitats one typically associates with estuaries are not obvious in this unit, Winchester Creek is tidally influenced throughout this area and the tributary and upland habitats present are typical of upper sloughs. The structures present provide the basis for on-site administrative facilities as explained above.

A demonstration salmon egg hatch box and interpretive sign are located near Wasson Creek. This display was constructed by the Oregon Department of Fish and Wildlife and the Northwest Steelheaders angling club.

Unit Management Plan

Phase I: Present to June 1985. Since acquisition of the property, management of this site has consisted of developing on-site sanctuary program facilities for administration of the sanctuary and visitor interpretive and information facilities. Public access has been improved by developing an initial system of trails, and unsanitary and unsafe conditions have been remedied. The site has been made as secure as possible without having an on-site caretaker.

Administrative facilities now present include:

- An administrative office and reception area
- A visitor interpretive area
- A 10-person "auditorium"
- A meeting room/ dining hall A kitchen
- Two large bathrooms
- Two bedrooms usable overnight for a \$2.50/person/night fee by education and research people, or as housing for sanctuary interns
- A small laboratory
- A two-car garage
- Storage areas for tools and equipment
- Parking for about 30 cars in the summer and about 10 cars during the winter
- A 0.9-mile long driveway with a security gate at the entrance locked after hours
- Appropriate information signage
- An office water system consisting of spring box, sub-surface holding tank of about 1,500 gallons, a chlorinator, a filtering system, a pressure tank, a pump and requisite piping. All parts of the system except spring box and holding tank are housed in small building

- A septic system consisting of a 1,000 gallon septic tank, a 150-gallon pump, a 2,000 square foot curtained drainfield and requisite piping
- Other improved major facilities in this unit include:
 - A recently constructed barn with cement floor of about 1,185 square feet
 - A two-story house built circa 1905 of about 690 square feet per floor

The Phase I work program will attempt to increase administrative efficiency, improve visitor access and site usability and complete the removal of any unsafe conditions still remaining. Increasing administrative efficiency will involve relocating the office and interpretive functions to Unit LD2.

Improving visitor access and site usability will be accomplished by: -Improving the present road to the office:

- Improving the present road to an existing parking area
- Improving all parking areas in the unit by grading and graveling where appropriate
- Improving all hiking trails
- Removal of unsafe conditions will include:
 - Completing the cleanup of an old barn now in the process of being removed
 - Completing the cleanup of the site of an old house recently burned down as a fire department training exercise

Phase II: July 1985 to June 1989. Phase II work will separate the on-site activities into two facilities, one devoted to making interpretive materials and the staff available to the public at a more convenient location adjacent to the Estuary Study Trail, and devoting the present administration building to maintenance storage facilities, science laboratory needs and overnight visitor use. This latter structure is located out of the way at the end of the gated entrance road. Research demand for the use of the sanctuary should be sufficient by this time to require the expansion of the research support facilities. This will be done by remodeling the 1905 two-story farmhouse into a research housing facility, including the establishment of an adequate water system and an adequate septic system.

Phase III: July 1989 - Beyond. Phase III work will remove the maintenance functions out of the split-level home previously used for maintenance and short-term overnight housing, and improving the overnight group use of the structure. This will involve:

- Improvement of a road to the new barn site which is suitable for development into a low-intensity use garage and storage building
- Remodeling of the overnight use facilities to improve the kitchen facilities, dining area and bathroom/shower facilities
- Improvement of the present septic drainfield as required
- Removal of the old shed presently used for maintenance and storage
- Construction of simple cabins or tent platforms to improve the overnight visiting group facilities
- Expansion of the science lab into the garage formerly used for storage and as a maintenance garage

Land management actions in this unit for all phases include maintaining the old fields free of noxious weeds such as Canadian thistle and Tansey ragwort by hand removal. Wetlands will be permitted to become reestablished but efforts will be mounted to keep portions of the valley floors clear of successional reforestation stages *through* hand-removal of pioneer species. This management action

will be taken in this unit to maintain a diversity of habitats to serve as the raw material for controlled investigation of old field habitats and to support populations of native grazers and other species.

Limited Development 2 (LD2) Management Unit

Description

This unit is bounded on the north by a line 500 feet northward of any sanctuary-maintained roads or trails on the site and located on sanctuary property from Seven Devils Road to the mean high tide line, and bounded on the south by a line 500 feet southward of any sanctuaries maintained roads or trails and located on sanctuary property from private property along Seven Devils Road to the mean high tide line (see Figure 12). Unit LD2 consists of about 65 acres which is about 1.5 percent of the sanctuary as presently constituted. A series of vegetated spoil islands in the estuary adjacent to the uplands are included in this unit.

General Characteristics

Access. Primary access to the unit is by Seven Devils Road, with access onto the site by a system of old logging roads. The first approximately 3/4 mile of logging road was regraded within the past five years and the latter 1 1/2 miles or so are in an abandoned condition. This latter portion is used as a foot access trail to an educational area called the Estuary Study Trail. None of the old roadbeds are publicly dedicated. Access to the unit by boat is along all portions adjacent to the estuary at high tides, and the northernmost portion only by canoe at all tides.

Past Uses. Past uses of this unit include: homesteads; agricultural uses such as domestic animal grazing; forestry, including logging, log transportation by railway and dumping of the logs for rafting; and for recreational pursuits, particularly duck hunting. Most of this unit was logged leaving an approximately 500-foot forested buffer adjacent to the high tide line. The grazing was conducted on diked marshlands now subjected to normal tidal activity through the degradation of the dikes. No known historic or pre-historic Indian sites are present in this unit.

As noted for unit LD1, however, the whole of South Slough has a tradition of usage by the Indian tribes of the region.

Structures. The present primary developments in unit LD2 are the roads and associated parking areas. All roads and parking have been developed utilizing existing logging roads or log landings. The only other developments are walking trails with their associated simple foot bridges and other environmental protection devices, a storage shed for storing the educational materials used by schools engaged in Estuary Study Program (ESP, see Section VI), two crude bathrooms with a composter unit, and remnants or artifacts of past historical uses of the site, such as pilings, which are used as the basis for portions of the ESP. The walking trails total about 2.5 miles in length. There are presently no utilities or developed water supplies on the site.

Special Values

The outstanding characteristics of this unit are its open nature due to recent clearcutting which permits a panoramic view of the slough and the whole Coos Bay/North Bend area, easy access to estuarine habitats typical of the South Slough, varied and scenic habitats through which the visitor

walks in getting to the estuary, the protected nature and hence safer accessibility the site provides, and the many interesting historical artifacts still in evidence that provide a solid on-site support basis for various educational activities. These values formed the basis of the decision to locate the future visitor center in this unit.

A stream enhancement demonstration project was recently completed in this unit.

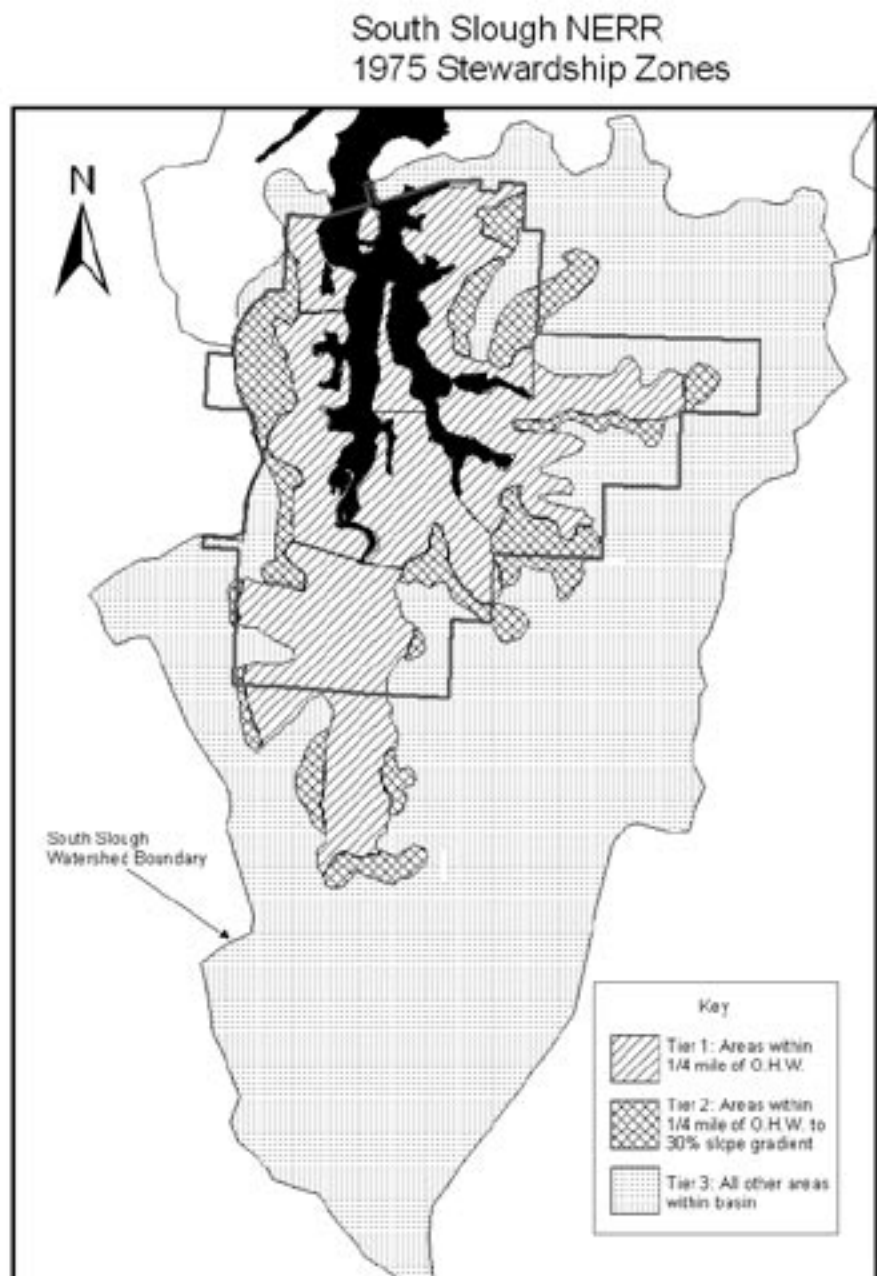
Unit Management Plan

Phase I: Present to June 1985. Since acquisition of this property, management of this site has consisted of utilizing available topographical and artifactual opportunities to develop general visitor and school access to the estuary. Phase I for this unit consists of continuing to improve the visitor use of this site by:

- Improvement of the Estuary Study Trail
- Construction of a mudflat study platform
- Construction of composting toilets on the Estuary Study Trail

Construction of the initial portion of a new visitor center including: construction of a small office/interpretive center building and restrooms; providing electrical power to the building site; construction of a drainfield on-site with the potential to accept the volumes expected from the future visitor center; construction of a caretaker house or trailer hookup tied into the on-site power and drainfield; and improvement of roads and parking required to handle the expected traffic volumes

The construction site chosen is close to a main road and has an excellent visual access to the Coos Bay/North Bend

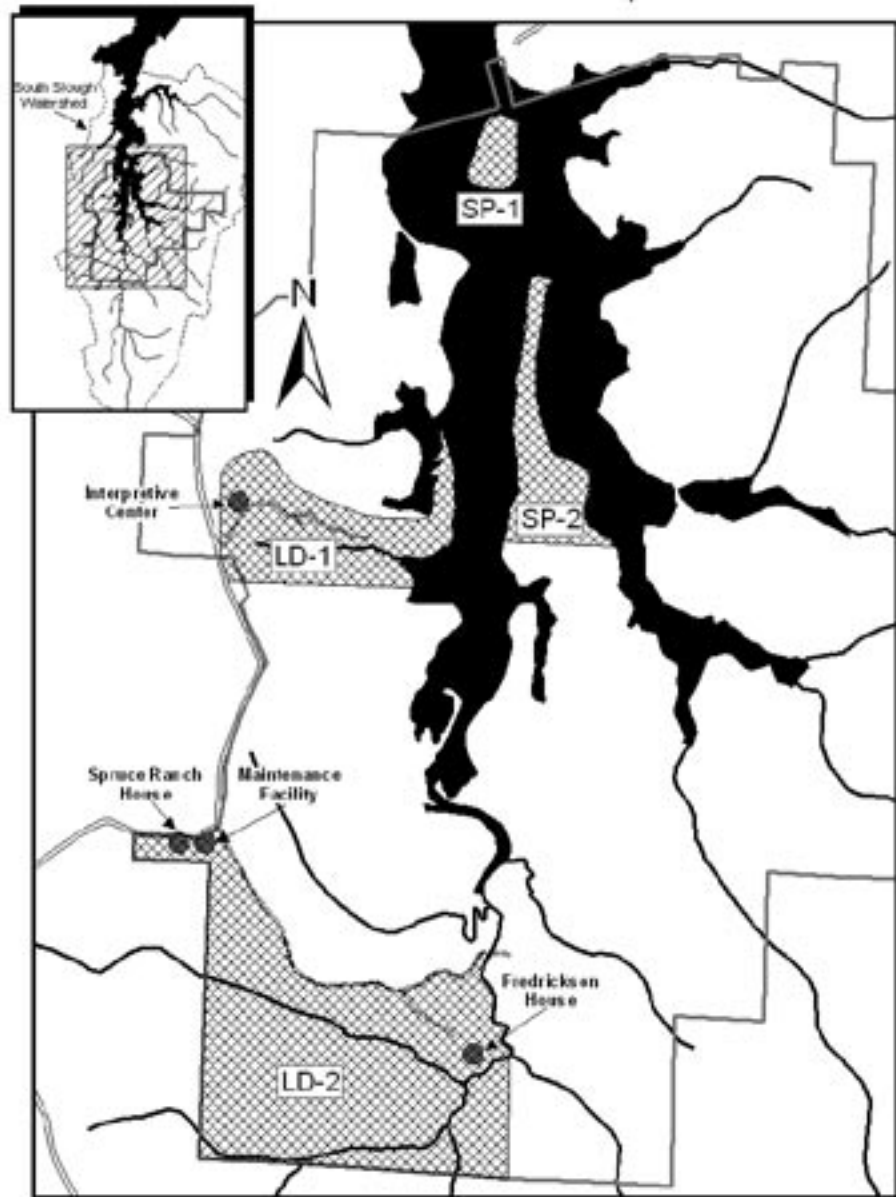


Key

- SP-1 Valino Island
Special Protection: Minimal access, exceptional qualities.
- SP-2 Long Island Point
Special Protection: Minimal access, exceptional qualities.
- LD-1 Interpretive Center and Trails
Limited Development: Vehicular access, site already disturbed.
- LD-2 Intern Housing Area
Limited Development: Vehicular access, site already disturbed.

All otherwise undesignated land area is classified as "Sanctuary"; all tidally submerged and submersible lands are classified as "Natural Aquatic." See Appendix H for descriptions of units and stewardship objectives

South Slough NERR
1984 Stewardship Zones



area and to South Slough. Associated with the center will be any new visitor access trails required to link the interpretive center with existing trails.

Phase II: July 1985 to June 1989. Visitor volumes are expected to have increased such that an expanded capacity to deal with the visiting public will be required. The construction plans for the interpretive center are phased to facilitate development as resources and need require.

Phase III: July 1989 - Beyond. Land management of this site will have eliminated unused portions of logging roads and continued to maintain visual pathways from the visitor center. Construction of an observation tower may be required if tree growth surpasses the ability to maintain visual pathways. Efforts will be made to maintain the areas accessed by the trails free of non-native species to the extent practical and with successional stages resulting from natural revegetation of the site. This will provide one upland trail with a diversity of habitats due to natural succession and will be an example of a "non-managed" forest.

Core Recommendations of the South Slough NERR Cooperative Plan for Watershed Conservation

1. South Slough NERR staff should form an acquisition team that will assist the South Slough NERR Management Commission's implementation of the Conservation Plan. The team will coordinate with the South Slough NERR Management Commission members through special work sessions and work plans submitted at Management Commission meetings. The team should have the following composition:
 - Team Leader (South Slough NERR Manager as agent of Reserve's decision making body, the South Slough NERR Management Commission)
 - Acquisition Coordinator (State personnel funded through grant funds)
 - Natural Resource Specialists (South Slough NERR Stewardship Coordinator/South Slough NERR staff as needed)
 - Real Estate Negotiator (Existing state personnel as needed)
 - Legal Counsel (Existing state personnel as needed)

2. South Slough NERR acquisition properties should meet three general conservation goals:
 - Protect the integrity of the existing "investment" (lands within the current administrative boundary).
 - Enhance the Reserve's ability to more fully meet its research, stewardship and education objectives.
 - Address specific projects and opportunities (such as establishing a "working ranch" or partnering with local entities to promote sustainable economic development or ecotourism).

3. The South Slough NERR should allocate acquisition resources to seven areas (as amended by the WTRP Advisory Group, 2003):
 - 1) *Winchester Creek Watershed* (estimated to require 10% of resources)
 - 2) *Tributary watersheds that feed into the existing South Slough NERR* (estimated to require 30% of resources)
 - 3) *Other tributaries, ocean inputs, and shorelines north of the South Slough NERR* (estimated to require 25% of resources)

- 4) *Charleston*, potential establishment of administrative offices / interpretive facility. (estimated to require 15% of resources)
 - 5) *Existing South Slough NERR ownership* (estimated to require 5% of resources)
 - 6) *Coos Bay Estuary* (estimated to require 10% of resources)
 - 7) *Biogeographic region opportunities* (partnerships with other public entities in the bioregion). (estimated to require 5% of resources)
4. South Slough NERR acquisition properties should include at least one of the following landscape characteristics (property selection criteria):
- Coastal cliffs, coastal shrubland, coastal grassland, intertidal beaches, subtidal hard bottoms
 - Headwaters of South Slough drainages
 - Tidal shorelands in the South Slough estuary
 - Mineral/water rights for lands within the current reserve boundary
 - Shoreline access points
 - Coastal uplands (with or without timber)
 - Developed shoreline environments
 - Areas that ensure conservation of aesthetically and culturally important sites, views, and sounds
 - Areas that contain biologically and archaeologically important resources
 - A ranch or farm situated on a former tidal marsh
 - Areas that include fish and shellfish habitat
5. The Chalmer Gustafson estate funds should be augmented with public and private habitat conservation funds for property acquisition to maximize the acquisition potential of the bequest. Gustafson estate funds will be used only for fee-simple purchases of South Slough watershed properties south of Valino Island (properties to be added to the Reserve). Grant funds will be used for both fee simple and less than fee simple purchases in any of the seven acquisition areas indicated on the attached diagram (properties to be added to or managed by the Reserve).
6. Acquisition will take place only with willing participants on a “willing buyer/willing seller” basis.

Memorandum of Agreement Between the National Oceanic and Atmospheric Administration and the Oregon Department of State Lands

Memorandum of Agreement Between The National Oceanic and Atmospheric Administration The Oregon Department of State Lands and The South Slough National Estuarine Research Reserve Management Commission

Detailing the state-federal roles in the management of the
South Slough National Estuarine Research Reserve

This Memorandum of Agreement states the provisions for the cooperative management of South Slough National Estuarine Research Reserve in the state of Oregon, between the State of Oregon and the National Oceanic and Atmospheric Administration's Office of Ocean and Coastal Resource Management.

WHEREAS, the Oregon Legislature has determined that the waters and related coastal habitats of the state provide unique opportunities to study the natural and human processes occurring within the estuarine ecosystems of the state, to contribute to the science of estuarine ecosystem processes, to enhance environmental education opportunities, and to provide scientific information for effective coastal zone management in state of Oregon; and

WHEREAS, the State of Oregon has determined that the resources of the South Slough National Estuarine Research Reserve and the values they represent to the citizens of Oregon and the United States will benefit from the management of these resources as part of the National Estuarine Research Reserve System; and

WHEREAS, the National Oceanic and Atmospheric Administration (NOAA) has concurred with these findings and pursuant to its authority under section 315 of the Coastal Zone Management Act of 1972, as amended (CZMA, P.L. 92-583, 16 U.S.C. 1461) and in accordance with implementing regulations at 15 CFR 921.30 has designated the South Slough National Estuarine Research Reserve; and

WHEREAS, the Oregon Department of State Lands and the South Slough National Estuarine Research Reserve Management Commission were designated by the Oregon Legislative Assembly to be responsible for managing the South Slough National Estuarine Research Reserve and acknowledge the value of state-federal cooperation for the long-term management of the Reserve in a manner consistent with the purpose of their designation; and

WHEREAS, the management plan describes the goals, objectives, strategies/actions, administrative structure, and institutional arrangements for the Reserve, including this MOA and others;

NOW THEREFORE, in consideration of the mutual agreements herein, NOAA and State of Oregon agree to the following:

ARTICLE I: STATE-FEDERAL ROLES IN RESERVE MANAGEMENT

A. Role of Oregon in Reserve Management

The South Slough National Estuarine Research Reserve Management Commission and the Oregon Department of State Lands shall:

1. be responsible for compliance with all federal laws and regulations, and ensure that the South Slough National Estuarine Research Reserve management plan is consistent with the provisions of the CZMA and regulations;
2. ensure protection of the natural and cultural resources of the Reserve, and ensure enforcement of the provisions of state law, including rules and regulations of the Oregon coastal management program if applicable;
3. annually apply for, budget, and allocate funds received for Reserve operations, research and monitoring, education and stewardship; and as necessary, land acquisition and Reserve facility construction;
4. conduct and coordinate research and monitoring programs that encourage scientists from a variety of institutions to work together to understand the ecology of the Reserve ecosystem to improve coastal management;
5. conduct and maintain programs that disseminate research results via materials, activities, workshops, and conferences to resource users, state and local agencies, school systems, general public, and other interested parties;
6. provide staff and endeavor to secure state funding for the manager, education coordinator and research coordinator;
7. secure facilities and equipment required to implement the provisions within the Reserve management plan;
8. ensure adequate funding for facilities operation and maintenance;
9. maintain effective liaison with local, regional, state, and federal policy makers, regulators and the general public;
10. serve as principal negotiators in issues involving proposed boundary changes and/or amendments to the Reserve management plan;
11. respond to NOAA's requests for information, particularly cooperative agreement and grant progress reports and evaluation findings, including necessary actions and recommendations, made pursuant to Section 312 of the CZMA.

B. Federal Role in Reserve Management

NOAA's Office of Ocean and Coastal Resource Management shall:

1. serve to administer the provisions of the Sections 312 and 315 of the CZMA to ensure that each Reserve operates in accordance with goals of the Reserve system and the South Slough National Estuarine Research Reserve management plan;
2. review and process applications for financial assistance from the Oregon Department of State Lands, consistent with 15 CFR 921, for management and operation, and as appropriate, land acquisition and facility construction;
3. advise Oregon Department of State Lands and the South Slough Management Commission of existing and emerging national and regional issues that have bearing on the Reserve and Reserve system;

4. maintain an information exchange network among Reserves, including available research and monitoring data and educational materials developed within the Reserve system;
5. to the extent possible, facilitate NOAA resources and capabilities in support of Reserve goals and programs.

C. General Provisions

1. Nothing in this agreement or subsequent financial assistance awards shall obligate either party in the expenditure of funds, or for future payments of money, in excess of appropriations authorized by law.
2. Both parties agree to comply with all applicable federal and state laws regulating ethical conduct of public officers and employees.
3. Each party will comply with all applicable laws, regulations, and executive orders relative to Equal Employment Opportunity.
4. Upon termination of this agreement or any subsequent financial assistance awards to Oregon Department of State Lands, any equipment purchased for studies to further this agreement will be retained by the party that made the initial purchase.
5. A free exchange of research and assessment data between the parties is encouraged and is necessary to ensure success of cooperative studies.

D. Other Provisions

1. Nothing in this agreement diminishes the independent authority or coordination responsibility of either party in administering its respective statutory obligations. Nothing in this agreement is intended to conflict with current written directives or policies of either party. If the terms of this agreement are inconsistent with existing written directives or policies of either party entering this agreement, then those portions of the agreement which are determined to be inconsistent with such written directives and policies shall be invalid; but the remaining terms not affected by the inconsistency shall remain in full force and effect. At the first opportunity for revision of this agreement, all necessary changes shall be made by either an amendment to this agreement or by entering in a new superseding agreement, which ever is deemed expedient to the interested parties. Should disagreement arise on the interpretation of the provisions and/or amendments of this agreement that cannot be resolved by negotiations at the operating level of each party, the area(s) of disagreement shall be stated in writing by each party and promptly presented to a mutually approved mediator for non-binding mediation. If the parties cannot agree on the choice of a mediator or if the mediation does not resolve the dispute to the mutual approval of the parties, the parties are free to pursue any other legal remedies that are available.

ARTICLE II: REAL PROPERTY ACQUIRED FOR PURPOSE OF THE RESERVE

As well as agreeing to adhere to the rest of the provisions set forth at 15 CFR 921, the South Slough Management Commission and the Oregon Department of State Lands agree to the conditions set forth at 15 CFR 921.21 (e), which specify the legal documentation requirements concerning the use and disposition of real property acquired for Reserve purposes with federal funds under Section 315 of the CZMA.

ARTICLE III: PROGRAM EVALUATION

The Office of Ocean and Coastal Resource Management Division of NOAA will schedule periodic evaluations of Oregon's performance in meeting the terms of this agreement, financial assistance awards, and the Reserve management plan. Where findings of deficiency occur, NOAA may initiate action in accordance with the designation withdrawal procedures established by the CZMA and applicable regulations.

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ARTICLE IV: EFFECTIVE DATE, REVIEW, AMENDMENT AND TERMINATION

- A. This agreement is effective on the date of the last signature on this agreement and shall be in effect until terminated by either party.
- B. This agreement will be reviewed periodically by both parties and may only be amended by the mutual written consent of both parties.
- C. This agreement may be terminated by mutual consent of both parties, or by NOAA if NOAA withdraws designation of the Reserve within the Reserve system, pursuant to applicable provisions of the CZMA and its implementing regulations as described under 15 CFR 923 Subpart L. The agreement may be terminated by Oregon Department of State Lands with or without cause. Should this agreement be terminated, reimbursement of unexpended funds from financial assistance awards shall be determined on a pro rata basis according to the amount of work done by the parties at the time of termination. Additionally, reimbursement for land purchased and facilities constructed with NOAA funds shall be consistent with terms and special award conditions of financial assistance awards.

IN WITNESS THEREOF, the parties have caused this agreement to be executed.

 Eldon Hout
 Director
 Office of Ocean and Coastal
 Resource Management
 National Ocean Service
 National Oceanic and
 Atmospheric Administration
 U.S. Department of Commerce

 Ann Hanus
 Director, Department of State Lands
 Chair, SSNERR Mgmt Commission

 Date

 Date

Director Ann Hanus, Department of State Lands, signs a Memorandum of Understanding with the National Oceanic and Atmospheric Administration setting forth the terms of operation of the South Slough National Estuarine Research Reserve.





Bylaws of the South Slough National Estuarine Sanctuary Advisory Group

ARTICLE I NAME

The name of this group shall be the South Slough National Estuarine Sanctuary Advisory Group, and shall be referred to as the Advisory Group.

ARTICLE II GOAL

The goal of the Advisory Group is to advise the South Slough National Estuarine Sanctuary Management Commission with scientific/technical expertise. The Group will serve to objectively assess the impact of activities on the Sanctuary, recommend “actions to the Management Commission, and to help provide direction for the Sanctuary’s programs. This group should evaluate and make recommendations on proposed scientific, educational, and recreational uses of the Sanctuary. Finally, the group will provide a communication link with other interested scientists, technical specialists, and members of the public.

SPECIFICALLY:

1. To advise the Commission as to how the Sanctuary program requirements can be fulfilled.
2. To advise the Commission on scientific, educational, and technical aspects of Sanctuary management questions.
3. To advise the Commission on research needs for the Sanctuary, potential funding sources, and public use aspects of Sanctuary management questions.
4. To assist in the development and implementation of the long-term monitoring program at the Sanctuary.

ARTICLE III

Number of Appointees: 12

Advisory Group Appointments:

Persons serving on this group shall be appointed by the Management Commission. The Advisory Group shall have the right to nominate candidates for Commission consideration, and further, shall have the right to indicate a preferred candidate from those names submitted.

Terms of Office:

The term of office of each member is two years, with approximately one half of the total membership expiring on each even numbered year and the other one half on each odd numbered year. All terms of office shall begin in October. There is no limit to the number of consecutive terms that may be served by the same person.

Filling Vacancies:

When vacancies are anticipated, new member's names should be solicited. The Advisory Group will recommend their appointment preferences to the Management Commission.

Failure to Attend Meetings:

If a member misses three consecutive regular meetings the Advisory Group can vote on termination.

Expense Reimbursement:

No member of the Advisory Group shall be reimbursed for any expenses occurring in their official capacity as a member of this group.

**ARTICLE IV
REPRESENTATION AND VOTING**

Each Advisory Group member shall have one vote.

**ARTICLE V
OFFICERS**

Section I

The officers of the Advisory Group shall be a Chairperson, a Vice-Chairperson, and a Secretary. The officers shall perform the duties prescribed by these bylaws and by the parliamentary authority adopted by the group.

Section 2

The officers shall be elected to serve for one year or until their successors are elected. Their term of office shall begin at the July meeting. Officers may serve for an unlimited number of terms.

**ARTICLE VI
MEETINGS**

Section I

The regular meetings of the Advisory Group shall be held as needed and at least twice a year. The time and place of the meeting shall be given in writing at least ten days prior to the date of the meeting.

Section 2

Special meetings can be called by the Chairperson, or shall be called upon the written request of a quorum of the Advisory Group. The purpose of the meeting shall be stated in the call. Except in cases of emergency, at least 14 days notice shall be given.

Section 3

Seven voting members of the Advisory Group shall constitute a quorum. A simple majority of the quorum shall be necessary to act upon any question.

Section 4

The regular agenda is to be determined by the Chairperson with the assistance of Sanctuary staff and mailed out so that it is received prior to the regular meeting.

Section 5

Meeting notices will be prepared and given by the Advisory Group Secretary or the SSNES staff.



Section 6

The duties of the Chairperson are to preside over all regular and special meetings, to represent the Advisory Group at Management Commission meetings and elsewhere as necessary, and to see that all of the terms of the bylaws are enforced.

The duties of the vice-chairperson are to preside in the absence of the chairperson as they may be asked.

The duties of the secretary are to record the minutes of each meeting, compile and maintain any other records as may be required, see that the agendas and minutes of past meetings are made available to the Advisory Group membership, and serve in place of the chairperson and vice-chairperson should both of these officers be unable to assume their duties.

Should none of the officers be able to attend a meeting a temporary chairperson shall be chosen by the chairperson. The presiding officer shall be responsible for seeing that all records of a meeting are maintained in the absence of the secretary.

ARTICLE VII SUB-COMMITTEES

Upon the approval of the Advisory Group the members may appoint special and/or permanent sub-committees.

ARTICLE VII I PARLIAMENTARY AUTHORITY

The rules contained in the most recent edition of "Robert's Rules of Order", shall govern the Advisory Group actions wherever they are applicable and in which they are not inconsistent with these bylaws and any special rules or order the Advisory Group may adopt. However, the Advisory Group rules will supercede "Robert's Rules of Order."

ARTICLE IX AMENDMENT OF BYLAWS

These bylaws can be amended at any regular meeting of the Advisory Group by a two thirds vote of the membership provided that the amendment has been submitted in writing to all members at least 30 days prior to the vote.

ARTICLE X RATIFICATION

These bylaws and subsequent amendments shall be effective upon approval of a quorum of the Advisory Group.

Adopted by a quorum of the Advisory Group on September 30, 1985

Michael Graybill



Interagency Agreements Governing Operation of the Estuarine and Coastal Sciences Laboratory

Memoranda of Agreement

South Slough NERR operates the Estuarine and Coastal Science Laboratory (ECOS), located on the campus of the Oregon Institute of Marine Biology in Charleston. Two Memoranda of Agreement between the Department of State Lands, on behalf of South Slough NERR, and the University of Oregon, on behalf of OIMB, guide the use of offices and laboratory facilities and the sharing of other facilities between the South Slough NERR and the University of Oregon.

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**Interagency Master Agreement between
 The Oregon State Board of Higher Education
 on behalf of
 The University of Oregon for the Oregon Institute of Marine Biology
 and the
 Oregon Department of State Lands
 on behalf of
 The South Slough National Estuarine Research Reserve**

RECITALS

1. This Master Agreement (hereinafter referred to as “agreement”) is dated this ___ day of November 2005, and is between the Oregon Department of State Lands on behalf of the South Slough National Estuarine Research Reserve, an agency of the State of Oregon (hereinafter called SSNERR), and the Oregon State Board of Higher Education on behalf of the University of Oregon for the Oregon Institute of Marine Biology, an institution of the State of Oregon (hereinafter called OIMB).
2. Both SSNERR and OIMB are operated by the State of Oregon. The primary mission of both organizations is research and education. Both programs hold title to property on behalf of the State of Oregon and operate facilities in the rural coastal community of Charleston. This agreement has been developed and will be carried out in accordance with policies and budget authority of both organizations, the rules and laws of the State of Oregon, and the applicable policies of the Oregon Department of Administrative Services.

AGREEMENTS

1. Effective Date and Duration

This agreement shall be effective upon execution by both parties and shall terminate on September 30, 2010. Individual Task Orders will be sent to the Business Contact listed in Notices and Representatives and will become effective upon execution by both parties. This agreement may be extended by mutual agreement of OIMB and SSNERR in writing.

2. Intention

The intent of this agreement is to:

- (a) Support the mutual interests of both organizations and to increase the efficiency and effectiveness of services provided by the State of Oregon; and
- (b) Set out in general terms an agreement for cooperation between SSNERR and OIMB for new or on-going projects regarding:
 1. The development of facilities;
 2. The shared used of facilities;
 3. The shared use of equipment; and
 4. The administration of grants and finances,

4. (sic) Task Orders

- (a) Any project requiring the transfer of funds between the signatory parties will be described in a Task Order. When used, a task order will be appended to this agreement. Any cooperative project outlined in this agreement that can be accomplished without the transfer of fund does not require a Task Order.

- (b) Each project covered by a Task Order, or supplemental amendment to a Task Order, will incorporate the terms of this agreement, detail the scope of work, include a detailed budget, and identify the responsibilities of OIMB and SSNERR

FACILITIES

1. Facilities Development

- (a) When it is practical to do so, the parties agree to cooperate to develop facilities that benefit both organizations and increase efficiency and effectiveness. Examples of the types of facilities included in this agreement include storage, office, laboratory, meeting, education, logistics and trails. This agreement also covers facilities that support the missions of OIMB and SSNERR that may not be specified in the list of examples provided above. This agreement authorizes the transfer of funds between OIMB and SSNERR, as specified in Task Orders, for the purposes of developing new, or improving existing facilities.
- (b) The specific terms of ownership, design, construction, operation, and repair of each facility developed as a result of this agreement will be outlined in a separate facility-specific Task Order between the two parties named in this agreement.

2. Use of Facilities

- (a) This agreement authorizes the transfer of funds between OIMB and SSNERR for the use of facilities as described in individual Task Orders.
- (b) Both parties agree to share available space when possible to efficiently and effectively meet the needs of OIMB and SSNERR for maintenance, storage, accommodations, meetings, programs, and offices. Fees for use of certain facilities may be required in some cases. It shall be the responsibilities of the OIMB Director and the SSNERR manager to establish the availability of facilities and to determine if any fee will be required for the use of facilities.
- (c) Facility uses under this agreement may include but need not be limited by this agreement are as follows:
 - 1. Vessel, vehicle and trailer storage
 - 2. Short- and long- term storage of laboratory and field equipment
 - 3. Overnight Accommodations: Occasional arrangements for overnight accommodations at SSNERR or OIMB as available for researchers, educators and interns.

EQUIPMENT

1. Shared use of Equipment

- (a) Both parties agree to share equipment, vehicles, vessels and other tangible resources as appropriate and available. The party that owns the equipment shall retain inventory control and shall have priority for use. Use by either party of equipment, vehicles or other tangible resources owned by the other party shall be by pre-arrangement on an "as available" basis.
- (b) Use and replacement of supplies
Each party is responsible for the timely replacement of chemicals, fuel, and other supplies expended in the use of the equipment.
- (c) Maintenance, repair, and replacement costs
Each party will contribute as appropriate to the maintenance, repair and replacement of equipment used. In some cases, this contribution may be in the form of a user fee as established in the policies or rules of the parties.
- (d) Equipment uses under this agreement may include but need not be limited to:
 - 1. Scientific lab and field equipment:
Parties agree to share general laboratory and field equipment including incubators, freezers,

microscopes, centrifuges, water samplers, nets, tools, trawls, etc., as available. Use of a specific piece of equipment must be requested and scheduled through the faculty or staff member responsible for that piece of equipment.

2. Boats, vehicles, and boating equipment:
Parties agree to share boats, vehicles, and boating equipment as needed and as available, for purposes of supporting the operations, research or education missions of the respective organizations. The party that serves as the registered owner of the respective vehicles, boats or equipment shall have priority for use; use by the non-owner party shall be by pre-arrangement on an "as available" basis. Only authorized graduate students, staff, and faculty will be permitted to use OIMB and SSNERR vehicles or vessels.
3. A University of Oregon Driver Clearance Statement shall be obtained by all OIMB and SSNERR personnel who make use of OIMB vehicles. The use of SSNERR vehicles shall be limited to Authorized Drivers (as described by Oregon Administrative Rule 125-155-400). OIMB and SSNERR agree to abide by all state rules, guidelines, and policies governing the use of state vehicles, including provisions that prohibit the transportation of children and pets in state-owned vehicles. The specific terms of a vehicle use agreement will be developed in accordance with state motor pool and risk management policies and appended to this agreement.
3. *(sic)* Computer network and hardware.
Parties agree to share certain computer hardware including large format printers, Geographic Information Systems and other information systems, as appropriate and available.

JOINT PROPOSAL DEVELOPMENT

Parties agree to cooperate on the development of proposals for funding joint and collaborative projects that benefit both parties. These may include but are not limited to proposals for research, student support, and facility development. Jointly developed proposals shall include both direct costs and Facilities and Administrative costs as outlined in item 1.(c) under the Administration and Finance section of this agreement (below).

ADMINISTRATION AND FINANCE

1. Coordination of Administration and Finances

- (a) This agreement authorizes the transfer of funds between SSNERR and OIMB for activities and personnel. Each activity or transfer of personnel requiring the transfer of funds shall be set forth in a Task Order which shall be appended to this agreement.
- (b) Personnel
 1. Both parties agree to cooperate on the development of an administrative process to recruit, hire and pay interns, undergraduate students, graduate students, and other employees.
 2. This agreement authorizes generally the transfer of funds between parties to support employees covered by this agreement.

(c) Consideration

Each Task Order will contain a budget stipulating the funds available for the Task and an initial budget. Costs listed in the initial budget will be used as the basis for determining the funds available but the performing party will have budget flexibility, unless specifically stated otherwise in the Task Order.

Facilities and Administrative costs will be incorporated into each Task Order at the usual rates in place at the time for each party, specific to the type of work being performed, subject to mutual negotiation.

2. Indemnification

To the extent allowed under Article XI, section 7 of the Oregon Constitution and the Oregon Tort Claims Act (ORS 30.260-30.300), both parties agree to indemnify and save harmless the other party against all claims, demands, liabilities, and judgments arising out of, related to, or in connection with any negligent act or omission and its employees in the performance of services provided under this agreement. Both parties agree to comply with all federal, state, county, and local laws, ordinances, and regulations applicable to the work to be done under this agreement. Both parties agree to comply with all federal and state laws prohibiting discrimination on the basis of race, sex, national origin, religion, age, or disability. Failure or neglect on the part of either party to comply with any or all such laws, ordinances, rules, and regulations shall not relieve that party of these obligations nor of the requirements of this contract.

3. Independent Responsibility

Except as otherwise limited by Oregon law, ORS 30.260 through 30.300, and the Oregon Constitution, Article XI, Section 7, each party shall be responsible for its tortuous acts and those of its officers or employees arising out of, or in any way connected with the acts of each party under this agreement.

4. Self-Insurance Coverages

The parties understand that each is insured with respect to tort liability by the State of Oregon Insurance Fund, a statutory system of self-insurance established by ORS chapter 278, and subject to the Oregon Tort Claims Act (ORS 30.260 - 30.300). Each agency agrees to accept that coverage as adequate insurance of the other party with respect to personal injury and property damage.

5. Self-Insurance Loss Allocation

The agencies agree that any tort liability claim, suit or loss resulting from or arising out of the parties' performance of and activities under this contract shall be allocated, as between the state agencies, in accordance with law by the Risk Management Division of the Department of Administrative Services for purposes of their respective loss experiences and subsequent allocation of self-insurance assessments under ORS 278.435. Each party to this contract agrees to notify the Risk Management Division and the other agency in the event it receives notice or knowledge of any claims arising out of the performance of, or the agencies' activities under this contract.

6. Physical Damage

- (a) Excepting ordinary wear and tear, each party agrees to be responsible for any physical damage to facilities, equipment, boats, and vehicles incurred while using, including any deductible, regardless of fault, subject to the terms and conditions of DAS Risk Management Division property policy 125-7-101.
- (b) Necessary boat inventory and safety equipment will be the responsibility of each party prior to and upon return of a vessel. It is the user's responsibility to report routine maintenance requirements or problems of vessel or equipment to the owner.

7. Termination, Review, and Modification of this Agreement

- (a) The OIMB Director and the SSNERR manager shall review this agreement annually.
- (b) This agreement may be terminated by mutual consent of both parties, or by either party, upon 30 days notice in writing delivered by certified mail to the parties listed in "Notices and Representatives" below.

- (c) If the parties terminate this agreement, the parties shall address specifically any Task Order in effect at the time of termination. Any Task Order not specifically addressed shall be terminated at the time this agreement is terminated and any non-expended and non-obligated funds allocated under the Task Order shall be returned to the appropriate agency.

8. Notices and Representatives

Notices and communications concerning the administration of this agreement and concerning the technical aspects of the projects and tasks to be performed under this agreement shall be sent to the Technical, Financial and Business Contacts shown below. Invoices for the SSNERR shall be sent to the SSNERR Financial Contact shown below. Invoices for the OIMB shall be sent to the OIMB Business Contact shown below.

FOR OIMB

Technical Contact

Craig Young, Director,

Oregon Institute of Marine Biology
PO Box 5389
63466 Boat Basin Road
Charleston OR 97420
Tel:(541) 888-2581
Fax: (541) 888-3250

Financial Contact

Joyce Croes
OIMB Lab Manager
PO Box 5389
63466 Boat Basin Road
Charleston, OR 97420
Tel. 541-888-2581 x 202
Fax 541-888-3250

Business Contact

Aedra Reynolds, Sponsored Project
Administrator

Office of Research Services and
Administration (ORSA)
5219 University of Oregon
Eugene OR 97403-5219
Tel: (541) 346-5131
Fax: (541) 346-5138

FOR SSNERR

Technical Contact

Michael Graybill, Manager
South Slough NERR
PO Box 5417
Charleston, OR 97420
Tel: (541) 888 5558 x 24
Fax (541) 888-5559

Financial Contact

Jeannette Holman
Asst. Director for Administration and Finance
OR Department of State Lands
776 Summer St. NE
Salem, OR 97310
Tel (503) 378-3805-227
Fax (503) 378-4844

Merger Clause

THIS DOCUMENT CONSTITUTES THE ENTIRE AGREEMENT BETWEEN THE PARTIES. NO WAIVER, CONSENT, MODIFICATION OR CHANGE OF TERMS OF THIS AGREEMENT SHALL BIND EITHER PARTY UNLESS IN WRITING AND SIGNED BY BOTH PARTIES. SUCH WAIVER, CONSENT, MODIFICATION OR CHANGE, IF MADE, SHALL BE EFFECTIVE ONLY IN THE SPECIFIC INSTANCE

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AND FOR THE SPECIFIC PURPOSE GIVEN.

THERE ARE NO UNDERSTANDINGS, AGREEMENTS, OR REPRESENTATIONS, ORAL OR WRITTEN, NOT SPECIFIED HEREIN REGARDING THIS AGREEMENT.

Effective Date

This agreement shall become effective on the date of the last signature.

SIGNATURES

OREGON DEPARTMENT OF STATE LANDS ON BEHALF OF THE SOUTH SLOUGH NATIONAL ESTUARINE RESEARCH RESERVE

THE STATE OF OREGON ACTING BY AND THROUGH THE STATE BOARD OF HIGHER EDUCATION ON BEHALF OF THE UNIVERSITY OF OREGON FOR THE INSTITUTE OF MARINE BIOLOGY

Ann Hanus

Date

DSL Director and Chair of the SSNERR Management Commission

Lin Reilly

Date

Assistant Director for Contracting, Office of Research Services and Administration,
University of Oregon

Agreement Between
South Slough National Estuarine Research Reserve
and
The State of Oregon
Acting by and Through The Oregon State Board of Higher Education
on behalf of
The University of Oregon

This agreement is dated this _____ day of _____, 1993, by and between the South Slough National Estuarine Research Reserve, hereinafter called SSNERR, and the state of Oregon, acting by and through the Oregon State Board of Higher Education on behalf of the University of Oregon, hereinafter called the UNIVERSITY.

It is the desire of SSNERR to establish an understanding regarding the use of facilities at the Oregon Institute of Marine Biology by members of the staff at South Slough National Estuarine Research Reserve.

This agreement shall begin on August 15, 1993, and continue on a year-to-year basis unless a thirty (30) day termination notice is given by either party.

The monetary consideration shall be NONE.

SSNERR requests the following:

A. Laboratory Space

cubicle or office space as available for laboratory work, sorting, and identification; utilization of seatable space; occasional use of general laboratory equipment including incubator, refrigerator, freezer, microscopes, centrifuge, and darkroom.

B. Library Facilities

use of library facilities and loan rights to borrow materials for short-term use at South Slough Reserve.

C. Boat Storage

dry storage as available for South Slough Reserve's 17' Alumaweld Sea Dory, and occasional use as available of the Oregon Institute of Marine Biology dock within Charleston Harbor.

D. Dormitory Accommodations

occasional arrangements for dormitory accommodations as available for research and education interns engaged in projects based at South Slough Reserve.

E. Personnel Administration

occasional arrangements for hiring and payment of interns, undergraduate students, graduate students, and other employees based at the Oregon Institute of Marine Biology.

F. Research Coordination Committee

participation by members of the Oregon Institute of Marine Biology on an ad hoc committee to review priorities for research within South Slough National Estuarine Research Reserve.

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SSNERR agrees to indemnify and save harmless UNIVERSITY against all claims, demands, liabilities, and judgments arising out of, related to, or in connection with any negligent act or omission of SSNERR and its employees, in the performance of services provided under this agreement.

SSNERR agrees to comply with all federal, state, county, and local laws, ordinances, and regulations applicable to the work to be done under this agreement. SSNERR agrees to comply with all federal and state laws prohibiting discrimination on the basis of race, sex, national origin, religion, age, or disability. Failure or neglect on the part of SSNERR to comply with any or all such laws, ordinances, rules, and regulations shall not relieve SSNERR of these obligations nor of the requirements of this contract.

IN WITNESS WHEREOF, the parties hereto have caused their presence to be executed as of the date herein above first written.

This agreement shall not become effective until date of last signature.

MERGER CLAUSE THIS AGREEMENT CONSTITUTES THE ENTIRE AGREEMENT BETWEEN THE PARTIES. THERE ARE NO UNDERSTANDINGS, AGREEMENTS, OR REPRESENTATIONS, ORAL OR WRITTEN, NOT SPECIFIED HEREIN REGARDING THIS AGREEMENT. NO AMENDMENT, CONSENT, OR WAIVER OF TERMS OF THIS AGREEMENT SHALL BIND EITHER PARTY UNLESS IN WRITING AND SIGNED BY ALL PARTIES. ANY SUCH AMENDMENT, CONSENT, OR WAIVER SHALL BE EFFECTIVE ONLY IN THE SPECIFIC INSTANCE AND FOR THE SPECIFIC PURPOSE GIVEN. THE PARTIES, BY THE SIGNATURE BELOW OF THEIR AUTHORIZED REPRESENTATIVES, ACKNOWLEDGE HAVING READ AND UNDERSTOOD THE AGREEMENT AND TO BE BOUND BY ITS TERMS AND CONDITIONS.

SOUTH SLOUGH NATIONAL ESTUARINE RESEARCH RESERVE OREGON
STATE OF OREGON ACTING BY AND THROUGH THE STATE BOARD OF HIGHER EDUCATION ON
BEHALF OF THE UNIVERSITY OF OREGON

By:

By:

Michael Graybill, Manager South Slough National Estuarine Research Reserve

Lynda Shapiro, Director University of Oregon Oregon Institute of Marine Biology

By:

By:

Gary Gustafson, Director Oregon Division of State Lands

Sherri McDowell University of Oregon Director of Business Affairs

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Bylaws of the Friends of South Slough

BYLAWS OF FRIENDS OF SOUTH SLOUGH RESERVE, INC. (Including Revisions adopted 26 February 2005)

ARTICLE I - NAME AND PURPOSE

Section 1.1: This organization is a nonprofit corporation composed of persons interested in the enhancement of the South Slough National Estuarine Research Reserve. The purposes of this organization are to provide cultural, historical, educational and interpretative services for the South Slough National Estuarine Research Reserve and to assist in developing the Reserve in accordance with its purposes. This organization may also engage any lawful activity for which corporations may be organized under ORS Chapter 61, which is entitled “Nonprofit Corporations”. This organization shall be known as FRIENDS OF SOUTH SLOUGH RESERVE, INC.

ARTICLE II - MEMBERS

Section 2.1 Qualifications, Categories: The Corporation shall consist of one class of voting members. A member shall be a person who, or an organization which, supports the goals of the corporation, applies for membership, and pays an annual membership fee in an amount established by the board of directors. Membership categories shall be as follows: Senior, Student, Individual, Family, Life Member, Corporate, and Volunteer (awarded to volunteers who contribute more than 50 hours of service to FOSS the previous year). Membership fees shall be determined by the board of directors. The board of directors may change these categories of membership, and may determine the qualifications and benefits of each, by amendment to these bylaws.

Section 2.2 Annual Meeting: An annual meeting of the members and the board of directors shall be held during the months of January or February of each year within Coos County, Oregon. The date and place of the annual meeting shall be designated by the board of directors as prescribed by the Articles of Incorporation. Members to the board of directors shall be elected at the annual meeting; a report of financial status of the corporation shall be given by the treasurer; other matters of interest to the directors or members may also be discussed and considered. Notice of all meetings of the members shall be given to each member at the last address of record, by first class mail at least 7 days before the meeting, or by means other than first class mail at least 30 but not more than 60 days before the meeting. The notice shall include the date, time, place, and purposes of the meeting.

Section 2.3 Special Meetings: Special meetings of the members may be called by the president, or by the board of directors, or by twenty-five percent (25%) of the members entitled to vote at such meeting. The date, time and place of special meetings shall be determined by the board of directors.

Notice of special meetings, including an agenda of the items to be considered at such meetings, shall be personally delivered, sent by e-mail, or by any other means to each member at their address of corporate record not less than seven (7) days before the special meeting. The attendance of a member at any special meeting shall constitute a waiver of notice of such meeting.

Section 2.4 Voting: Each member, regardless of classification, shall be entitled to one vote. A member may vote in person or by written proxy. If the board of directors chooses, election of directors may be conducted by mail.

Section 2.5 Quorum: Those members present at any annual or special meeting of members constitute a quorum at the meeting. The vote of a majority of the members present or represented by proxy shall be necessary for the adoption of any matter voted upon by the members, unless a greater proportion is required by Oregon law.

ARTICLE III - BOARD OF DIRECTORS

Section 3.1: Duties: The business, property and affairs of this corporation shall be managed by a board of directors composed of neither less than four (4) nor more than eleven (11) persons. A current list of members serving on the board shall be available to the public and maintained by the board secretary. The board of directors shall have the power and authority to make rules and regulations for the guidance of officers and members of the corporation and for the transaction of the business of the corporation as necessary to carry out its purposes according to the authority granted nonprofit corporations under ORS 61.061.

Section 3.2 Election of Board: All members of the board of directors shall be elected at the annual membership meeting as set forth in the Articles of Incorporation and as described above.

Section 3.3 Vacancies: Any vacancy occurring in the board of directors ~~or~~ ~~and~~ any directorship to be filled by reason of an increase in the number of directors, shall be filled by the affirmative vote of a majority of the remaining directors. A director elected or appointed, as the case may be, to fill a vacancy shall serve the unexpired term of his or her predecessor until the election of board members at the next annual meeting.

Section 3.4 Quorum: A majority of the duly elected or appointed board members currently serving terms of office shall constitute a quorum for the transaction of business at any meeting of the board; but if less than a majority of the directors are present, the directors present may choose to gather information, but can take no other action but to adjourn the meeting. The act of majority of the directors present at a meeting at which a quorum is present shall be the act of the board of directors, unless the act of a greater number is required by law or by these bylaws.

Section 3.5 Meetings: The board shall regularly meet at least once a year at a date, time and place within Coos County, Oregon designated by the president and within thirty (30) days after the annual membership meeting. Special meetings of the board may be called by the president or at the request of the majority of the board, the date, time and place for which shall also be within Coos County, Oregon and designated by the president. Special meetings of the board may be held by telephone conference call, or the president may poll directors individually in person, via telephone or e-mail for guidance in handling routine matters, if all members of the board of directors are notified about such practice and if a majority of the board members agrees to such practice from time to time.

Section 3.6 Notice: Notice of any regular or special meeting of the board of directors shall be given at least seven (7) days prior thereto by written notice delivered personally, sent e-mail, or any other means to each director at his or her address as shown by the records of the corporation. If mailed, such notice shall be deemed to have been delivered when deposited in the United States mail in Coos County, Oregon, with postage thereon prepaid. A notice delivered by a personal phone call directed to a director not less than seven (7) nor more than twenty (20) days before a meeting shall be sufficient notice of any meeting even if written notice is not given. Any director may waive notice of any meeting. The attendance of a director at any meeting shall constitute a waiver of notice of such meeting, except where a director attends a meeting for the express purpose of objecting to the transaction of any business because he or she feels proper notice was not given or that the meeting was not lawfully convened.

Section 3.7: Role of the South Slough Manager: The manager of the South Slough National Estuarine Research Reserve shall serve as an ex officio member of the board of directors. The Manager shall be given notice of the meetings of the board on the same basis as the directors and shall be welcome to attend the meetings and to advise the board of directors on all matters relating to the South Slough National Estuarine Reserve.

Section 3.8: The initial board shall serve until the first annual membership meeting in 1990. At the first annual membership meeting in 1990 all board members shall be elected by the membership.

Section 3.9 Compensation: Directors as such shall receive no compensation for their services to the corporation, but the corporation may pay or reimburse directors for actual expenses incurred by them in connection with a meeting, or in carrying out the purposes of the corporation.

ARTICLE IV - OFFICERS

Section 4.1: The officers of the corporation shall be President, Vice President, Secretary, and Treasurer, and Historian-Archivist elected from the board of directors. All officers shall be elected annually by the board of directors at the first meeting of the board of directors following the annual meeting of the membership. Any officer can be removed by a majority vote of the board of directors. Any officer may be reelected but not for no more than three (3) consecutive terms in any one office. No person may hold more than one office at a time. Any vacancy occurring in any office by reason of removal, death, or resignation, may be filled by a majority vote of the board of directors.

Designated officers shall countersign deeds, documents, and checks as prescribed by the board of directors. In cases involving transactions in excess of \$250 the signatures of two officers will be required on all of the above.

Section 4.2 President: The president shall be the chief executive officer of the corporation and shall preside at all meetings of the members and all meetings of the board of directors, and shall have the general supervision and control of the affairs of the corporation. The president shall also from time to time make reports of the affairs of the corporation to the board of directors and in all matters shall be responsible to the board of directors. The president shall have such other powers and duties as the board may direct.

Section 4.3 Vice President: The vice president shall possess the powers and may perform the duties of the president in the event the president is absent or unable to act; and the vice president shall perform such other duties as may from time to time be prescribed by the board of directors.

Section 4.4 Secretary: The secretary shall keep records and minutes of all meetings of the members and of the board of directors, shall keep records of the names, addresses, e-mail addresses of the board of directors and shall on request make such information available to the general membership, and shall perform such other duties as may be prescribed by the board of directors.-

Section 4.5 Treasurer: The Treasurer shall prepare and sign all checks, drafts or orders for the payment of money, notes or other evidences of indebtedness issued in the name of the corporation; shall have custody of all funds and securities of the corporation and shall deposit all monies of the corporation in such bank or depository as the board of directors designates; shall make a full and detailed report of the condition of the treasury of the corporation, showing all receipts and disbursements since the last previous statement and the balance remaining on hand. The secretary, treasurer and the president shall prepare the annual budget of the corporation for approval by the board of directors. The treasurer shall perform such other duties as may be prescribed by the board of directors.

Section 4.6 Historian-Archivist: The historian-archivist shall keep the names and addresses of record for the general membership; shall organize and keep on file all records of meetings, documents, receipts, printed materials, photographs, and accomplishments of the Friends of South Slough; shall identify and notify members whose membership is expiring; shall date stamp, and distribute mail to appropriate board members. The historian-archivist shall perform such other duties as prescribed by the board of directors.

ARTICLE V - SIGNATURE AUTHORITY, FUNDS, BOOKS AND RECORDS

Section 5.1 Contracts. The president, secretary, and treasurer shall sign deeds, promissory notes, mortgages, bonds, contracts, or other instruments which the board of directors has authorized to be executed, except in where the signing and execution thereof shall be expressly delegated by the board of directors or by statute to some other officer or agent of the corporation.

Section 5.2 Checks, Drafts: For transactions in excess of two hundred and fifty dollars (\$250), all checks, drafts or orders for the payment of money, notes or other evidences of indebtedness issued in the name of the corporation shall be signed by the treasurer of the corporation and at least one other designated member of the board of directors.

Section 5.3 Deposits: All funds of the corporation shall be deposited in a timely fashion to the credit of the corporation in such banks, savings and loans, or other depositories as the board of directors may select.

Section 5.4 Gifts: The board of directors may accept on behalf of the corporation any contribution, gift, grant or bequest for the general purposes or for any special purpose of the corporation.

Section 5.5 Books and Records: The Corporation shall keep correct and complete books and records of accounts and shall keep minutes of the meetings of its members, board of directors and any committees having authority of the board. The treasurer shall be responsible for maintaining the books and records of accounts for the current year, and the secretary shall keep minutes of meetings for the same period. The Historian-archivist shall maintain books, records and minutes for all previous years. Copies of all such documents shall be maintained in the corporation's file at the South Slough Reserve visitor center, and may be inspected by any member, or the agent or attorney for any member for any proper purpose at any reasonable time.



Section 5.6 Accounting Year: The fiscal year of the corporation shall be the calendar year beginning January 1 and ending December 31 of each year.

ARTICLE VI - INDEMNIFICATION

Section 6.1: The corporation shall indemnify to the fullest extent permitted by the Oregon Nonprofit Corporation Law any person who has been made, or is threatened to be made, a party to an action, suit or proceeding, whether civil, criminal, administration, investigative, or otherwise (including an action, suit, or proceeding by or in the right of the corporation) by reason of the fact that the person is or was a director or officer of the corporation, or serves or served at the request of the corporation as a director or as an officer of another corporation, partnership, joint venture, trust or other enterprise. The right to and the amount of indemnification shall be determined in accordance with the provisions of the Oregon Nonprofit Corporation Law in effect at the time of the determination.

ARTICLE VII - AMENDMENTS

Section 7.1: These bylaws may be altered, amended or repealed and new bylaws may be adopted by a majority vote of the directors present at any regular meeting or at any special meeting of the directors. Amendments made by the board within any year will be presented for ratification by the membership at the annual meeting.

The undersigned officer of the corporation does hereby certify that the foregoing bylaws on this and the preceding six pages were duly adopted by the members as the bylaws of the corporation on the 26th day of February 2005, **and that they now constitute the bylaws of the corporation.**

Terry Huffman, President

Date

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State and County Land Use Regulation of South Slough NERR

In addition to state and Federal laws which apply specifically to the Reserve, all South Slough NERR land use is subject to general state and county land use regulations. This appendix provides Internet links to summaries of Oregon's land use laws as they apply to the Reserve, as contained in the Coos Bay Estuary Management Plan.

Land use regulations: <http://www.co.coos.or.us/planning/art4-5.pdf>

Land use planning policies: <http://www.co.coos.or.us/planning/appendix3.pdf>

