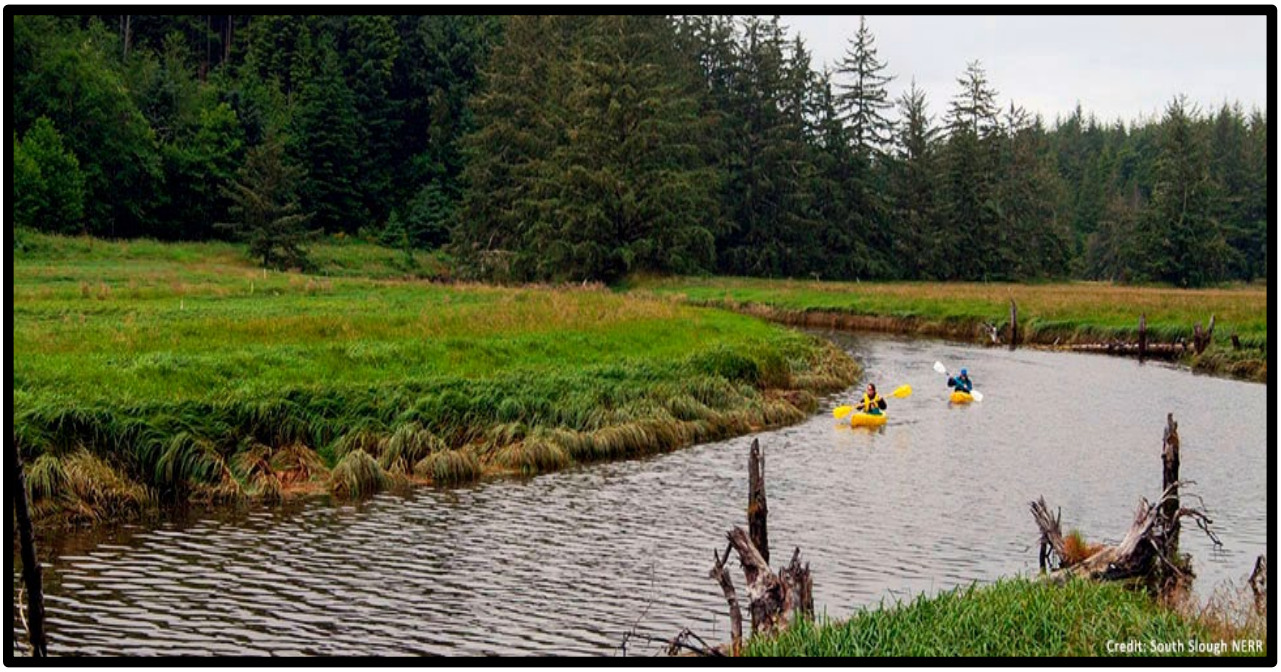
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

OFFICE FOR COASTAL MANAGEMENT

Final Environmental Assessment

South Slough National Estuarine Research Reserve Boundary Change



South Slough, Oregon

U.S. Department of Commerce
National Oceanic and Atmospheric Administration
Office for Coastal Management
1305 East West Hwy, N/OCM
Silver Spring, MD 20910
January 2024

List of Figures

List of Tables

Acronyms

AQI	Air Quality Index
BCC	USFWS Birds of Conservation Concern
CAA	Clean Air Act
CO	Carbon Monoxide
CELCP	Coastal and Estuarine Land Conservation Program
CEQ	Council on Environmental Quality
CZMA	Coastal Zone Management Act
DPS	Distinct Population Segment
DSL	Oregon Department of State Lands
EFH	Essential Fish Habitat
EPA	Environmental Protection Agency
ESA	Endangered Species Act
HAPC	Habitat Areas of Particular Concern
Magnuson-Stevens Act	Magnuson-Stevens Fishery Conservation and Management Act
MMPA	Marine Mammal Protection Act
MP	Management Plan
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NERRS	National Estuarine Research Reserve System
NHPA	The National Historic Preservation Act of 1966
NMFS	The National Marine Fisheries Service
NO_2	Nitrogen Dioxide
NOAA	The National Oceanic and Atmospheric Administration
O_3	Ozone
OCM	NOAA's Office for Coastal Management
Pb	Lead
PM-2.5, PM-10	Particulate Matter
PSU	Practical Salinity Units
SO_2	Sulfur Dioxide
SSNERR	South Slough National Estuarine Research Reserve
SWMP	System-Wide Monitoring Plan
U.S.	United States

Chapter 1 Introduction and Background

The National Oceanic and Atmospheric Administration (NOAA) designated the South Slough National Estuarine Research Reserve (SSNERR) in 1974 in Coos County, Oregon to serve as a stable platform for long-term research and education of the nation's estuaries. The South Slough Reserve is located on the Coos Estuary in southern Oregon and it encompasses a mixture of open water channels, tidal and freshwater wetlands, riparian areas, and forested uplands. The Coos Estuary is the sixth largest estuary on the Pacific coast of the contiguous United States (U.S.) and the largest estuary in Oregon. Oregon Department of State Lands (DSL) works collaboratively with local and regional partners and is under jurisdiction of the State Land Board. DSL serves as the state's lead agency for the SSNERR, in partnership with NOAA. The DSL Director also serves as the chair of the South Slough Reserve Management Commission, which comprises nine Governor-appointed members and serves as the immediate governing body of the SSNERR as established in Oregon statute (ORS 273.553).

The SSNERR operates several system-wide and SSNERR-specific programs to carry out its objectives, including management-related research, estuarine education, coastal training, land stewardship (including habitat restoration), and volunteer programs. It utilizes a science-based approach to land management and engages the public through volunteer and outreach events. The SSNERR also is committed to monitoring the key indicators of ecosystem health in the watershed. The SSNERR community collects, archives, and disseminates consistent, high caliber data on critical ecosystem characteristics. In order to educate the community about the watershed and inspire them to consider environmental conservation when making decisions affecting South Slough and its watershed, the SSNERR creates and implements environmental education programs for school-aged children, visitors, and decision makers.

The existing SSNERR boundary covers 4,771 acres (Figure 1.1). DSL has requested to add 1,771 acres to the SSNERR boundary (Table 2.1), which comprises the addition of:

- 30 acres to correct for the use of current GIS-based technology in calculating updated acreage for the boundary area since it was established in 1974;
- 1,541 acres of lands acquired since 2008 that are owned and managed by the Reserve outside of the SSNERR boundary; and
- 200 acres of state-owned waters in South Slough that connect the lands acquired since 2008.

In addition, SSNERR is exploring two proposed future acquisitions totaling an additional 105 acres (Figure 2.2, Table 2.1).

This Environmental Assessment summarizes the environmental consequences of the Federal action, approving the expansion of the SSNERR boundary, the boundary expansion alternatives,

as well as the alternative to take no action (leaving the boundary unchanged). The analysis evaluates the current and proposed future uses of the areas to be added, as well as the cumulative impact of these changes. The SSNERR is currently operating under the 2017-2022 Management Plan (MP).

NOAA reviewed the environmental and other consequences of the boundary change, as required by the National Environmental Policy Act of 1969 (NEPA), as amended (42 U.S.C. §§ 4321 et seq), NERRS statute (16 U.S.C. § 1451 *et seq*) and regulations (15 C.F.R. Part 921), the White House Council on Environmental Quality's Regulations for Implementing NEPA (40 C.F.R. Parts 1500-1508 (2022)),[1] the NOAA Administrative Order (NAO) 216-6A, and NOAA's Companion Manual to the NAO entitled "Policy and Procedures for Compliance with the National Environmental Policy Act and Related Authorities."

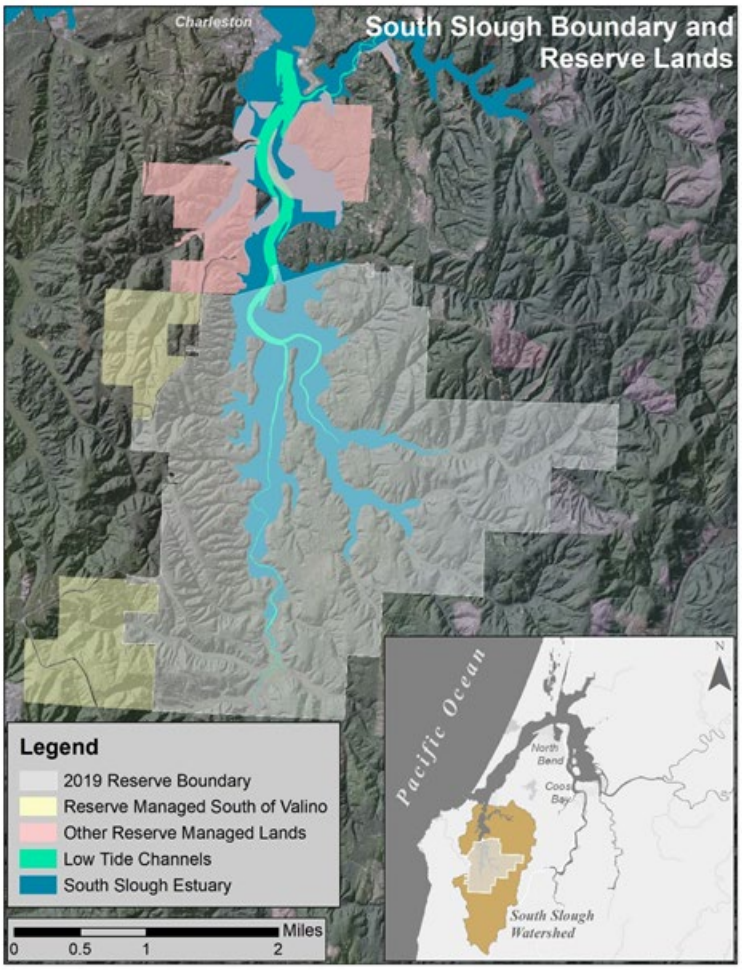


Figure 1.1: Map of South Slough Reserve in Oregon

[1] This EA applies CEQ's NEPA regulations currently in effect. See 50 C.F.R. § 1506.13.

1.1 Background

National Context

The Coastal Zone Management Act (CZMA) is the guiding legislation for the National Estuarine Research Reserve System (NERRS; 16 U.S.C. § 1451 *et seq*.) This Act, administered by NOAA's Office for Coastal Management (OCM), provides for the management of the nation's coastal resources, including the Great Lakes. The goal is to "preserve, protect, develop, and where possible, to restore or enhance the resources of the nation's coastal zone." (16 U.S.C. § 1452). The CZMA outlines three national programs, the National Coastal Zone Management Program, the NERRS, and the Coastal and Estuarine Land Conservation Program (CELCP). The National Coastal Zone Management Program aims to balance competing land and water issues through state and territorial coastal management programs. The Reserves serve as field laboratories that provide a greater understanding of estuaries and how humans affect them. CELCP provides matching funds to state and local governments to purchase threatened coastal and estuarine lands or obtain conservation easements.

The National Estuarine Research Reserve System is a growing network of 30 coastal sites designated to protect and study estuarine systems. Established through the CZMA, the Reserves represent a partnership program between NOAA and the coastal states. NOAA provides funding and national guidance, and a lead state agency or university manages each site with input from local partners. Figure 1.2 provides a map of the designated reserves.

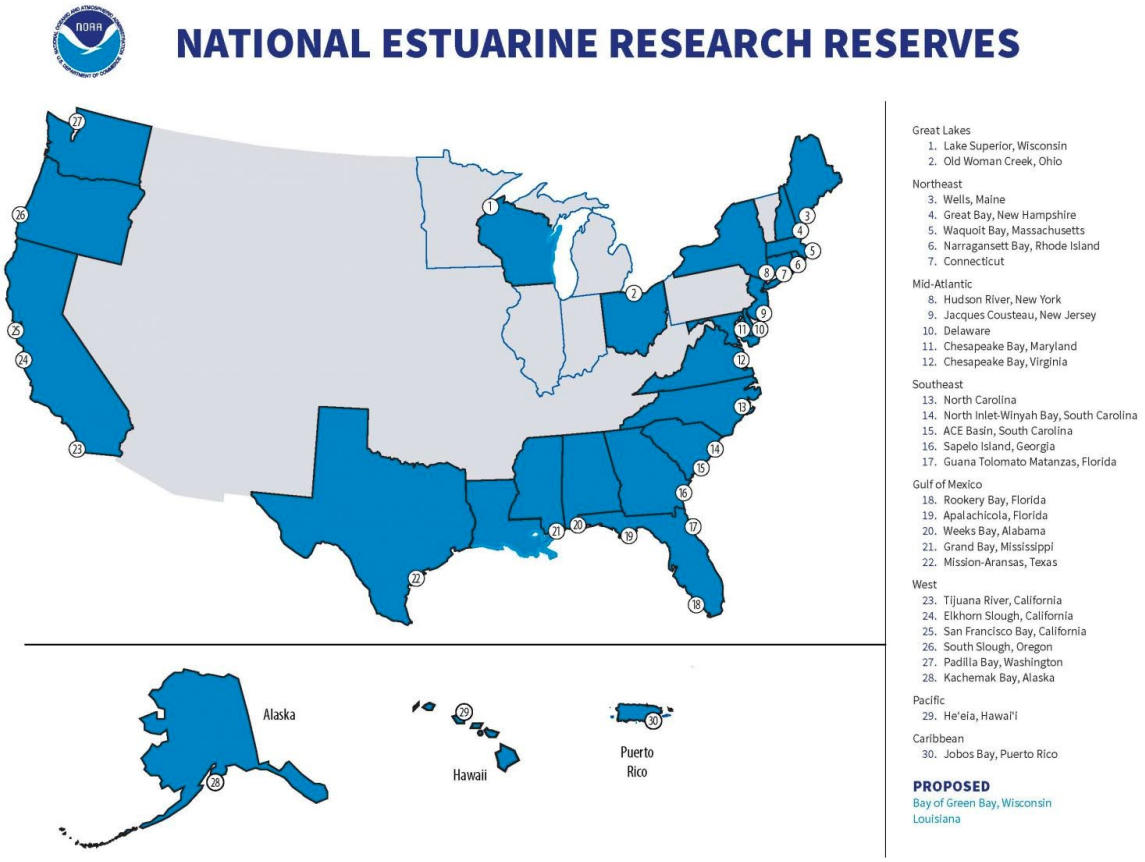


Figure 1.2: Map of the National Estuarine Research Reserves

The 30 Reserves cover nearly 1.4 million acres of estuaries and are focused on the following:

- Stewardship - Each site undertakes the initiatives needed to keep the estuary healthy.

- Research - Reserve-based research and monitoring data are used to aid conservation and management efforts on local and national levels.

- Training - Local and state officials are better equipped to introduce local data into the decision-making process as a result of reserve training efforts.

- Education - Thousands of children and adults are served through hands-on laboratory and field-based experiences. School curriculums are provided online.

The OCM encourages public awareness of coastal resources and best ways to address storm preparedness, erosion, development, habitat loss, sea level rise, public access, and threats to water quality, to name a few. As a scientific organization, NOAA provides access to the science and environmental intelligence communities need for these tasks. Under 15 C.F.R. § 921.33, changes to the boundary of a Reserve and major changes to the final MP, including state laws or regulations promulgated specifically for the SSNERR, may be made only after written approval by NOAA. NOAA issued a public notice for the proposed action, including placing a notice of

availability of the draft Environmental Assessment in the Federal Register to provide an opportunity for public comment for the proposed decision. One comment of "no comment" was received from the National Park Service in response to the invitation for public comment.

Reserve Context

The South Slough Reserve designation resulted from the concerted efforts of many citizens and elected officials who recognized the abundant resources and values provided by the South Slough. Since its founding as the nation's first NERR, the SSNERR has been a leader in improving the stewardship and understanding of Pacific Northwest estuaries and coastal watersheds.

All 4,771 acres of land within the SSNERR are owned by the DSL. Land ownership and use adjacent to the SSNERR is mostly forest managed for commercial timber production, especially to the south and east. The lands along the western and northeastern SSNERR boundary abut privately-owned and mostly residential parcels, while the privately-owned lands to the north of the SSNERR also include small businesses in Charleston. Oregon state law (ORS 273.553 *et seq.*) and administrative rules complement federal regulations by providing for the protection and maintenance of SSNERR resources through state policy.

The Coos Bay estuary comprises the largest and deepest port between San Francisco and the Columbia River. Coos County is home to about one-third of Oregon's coastal population and the SSNERR itself neighbors the two largest cities in the area, North Bend and Coos Bay. The SSNERR encompasses a mixture of open water channels, tidal and freshwater wetlands, riparian areas, and forested uplands. The South Slough has a long cultural history, having been inhabited for millennia by the Coos and Coquille Indians, and more recently by European descendants. The Tribal and European legacies within the SSNERR still influence working partnerships and program activities.

1.2 Description of the Proposed Action

Under the proposed action, NOAA would approve the incorporation of 1,771 acres into the existing management boundary of the SSNERR (15 C.F.R. § 921.33) (Table 2.1, Figure 2.1, Figure 2.2). Under the regulations, changes in the boundary of a Reserve and major changes to the final MP, including state laws or regulations promulgated specifically for the Reserve, may be made only after written approval by NOAA and publication of a Notice of Approval in the Federal Register. 15 CFR 921.33. If necessary NOAA will revise the designation document (findings) for the site. *Id.* NOAA may require public notice, including notice in the Federal Register and an opportunity for public comment before approving a boundary or MP change.

1.3 Purpose of the Proposed Action

The need of the proposed action is to further the NERR mission to better protect, conserve, and enhance the natural and cultural resources, values, and qualities of the Coos estuary on the south coast of Oregon. The purpose of the action is to consider the SSNERR's request to expand the boundaries of the existing South Slough NERR in a way that achieves these goals.

In considering a request to expand a boundary under 15 C.F.R. 921.33, NOAA is guided by the principles for site selection found in 15 C.F.R. § 921.11(c), namely, to ensure that expanded boundaries contribute to the characteristics for which the site was originally selected:

(1) The biogeographic region or subregion represented;
(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;
(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. Reserve boundaries encompass two areas: Key land and water areas (or "core area") and a buffer zone;
(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.

Any expansion must be compatible with the SSNERR's mission to:

- Increase opportunities for long-term scientific research and environmental education;
- Provide a scientific research and monitoring program, which is responsive to the resource management needs of the cooperators for ultimate improvement of the management of this coastal ecosystem;
- Enhance public awareness and understanding of the estuarine environment through the implementation of environmental education programs in the local public schools and the nearby communities, and by conducting on-site interpretation of the natural and cultural resources within the SSNERR; and
- Promote local, state, and federal government cooperation in the management of the SSNERR.

1.4 Public and Agency Involvement

The public had the opportunity to participate in public hearings when the Oregon legislature considered Senate Bill 126, which was passed by the Oregon legislature and signed by the Governor in 2021. The bill allows the Reserve to expand its boundary to include other lands acquired by the department that are connected to the South Slough estuary. The bill also amends ORS 273.553 (effective January 1, 2022) to remove language that previously established Valino Island as the northern boundary of the Reserve.

Chapter 2 Alternatives

This chapter describes the two alternatives considered by NOAA. Alternative 1, denying SSNERR's request to expand the boundary (No Action); and the Boundary Change Alternatives, approving SSNERR's request to expand the SSNERR boundary to include an additional 1,771 acres of lands and waters (Preferred Alternative), requested by the State of Oregon, for a total SSNERR boundary of 6,542 acres. We also consider a minor variation of Alternative 2, referred to as Boundary Alternative 2B, which includes the addition of 105 acres to the Boundary Expansion Alternative, which would expand the SSNERR to a total of 6,647 acres.

2.1 Alternative 1 (No Action)

Under the No Action alternative, NOAA would not approve the boundary expansion. Therefore, there would not be a change to the current SSNERR boundary. The original biological, aesthetic, and socioeconomic needs to protect the natural resources would continue. Additionally, the management actions described above including education, research activities, and ecosystem protection would continue. However, these benefits would not be afforded to the proposed expansion parcels.

2.2 Alternative 2 (Boundary Expansion Alternatives)

Under the Boundary Expansion Alternative 2, the preferred alternative, NOAA would approve Oregon's request to expand the SSNERR by incorporating an additional 1,771 acres (Table 2.1, Figure 2.1, Figure 2.2), resulting in a new total SSNERR area of 6,542 acres - all located in the South Slough watershed.

The proposed proposed expansion area includes:

- **30 acres** added as a correction to account for changes in GIS-mapping technologies since the Reserve was established in 1974. These areas were intended for SSNERR during its 1974 designation but were inadvertently excluded. In 2019, South Slough Reserve reviewed past mapping files for the reserve and identified a detailed list of corrections to the boundary that are due to misaligned property lines, rounding errors, and changes in calculation methods, among other issues.
- **1,541 acres** of parcels currently owned and managed by the SSNERR outside of the existing SSNERR boundary. The expansion parcels were acquired by DSL on behalf of SSNERR from 2008-2022 for purposes of environmental stewardship and habitat protection. The boundary change would extend the comprehensive conservation and management capacities identified in the NOAA-approved SSNERR MP to these new areas, providing a mechanism for implementation of specific restoration, monitoring, and research activities for important marine resources.
- **200 acres** of state-owned South Slough waters located adjacent to the expansion parcels. This area connects the expansion parcels across the waterway to create the proposed northern boundary of the SSNERR.

We also consider a slight variation of the boundary alternative, referred to as Boundary Alternative 2B, which consists of the Boundary Alternative 2 plus the potential planned future

acquisitions of two parcels, Deal and Winchester Uplands, which would add 105 acres to the boundary expansion area. This alternative also includes a very small modification to the Entrance Property, whereby the SSNERR would acquire less than a quarter of an acre of mature forest adjacent to the Entrance Property in exchange for a similar sized portion of grassland in the current boundary (part of the Entrance Property). The exchanged land would be removed from the boundary. There is no net gain or loss of acreage from this exchange.

The lands within the current and expanded SSNERR boundaries are all part of the South Slough watershed, which is the biogeographic unit of the SSNERR. In this alternative, NOAA proposes to find that the properties contribute to the NERR program through their biogeographical and ecological characteristics, value for scientific research and environmental education, and land acquisition and management considerations identified in 15 C.F.R. § 921.11(c). Expansion of the SSNERR boundary would preserve, protect, and restore coastal and estuarine ecosystems of the South Slough through long-term research, education, and training. Thus, this action would further the mission of the SSNERR, which is to improve the understanding and stewardship of Pacific Northwest estuaries and coastal watersheds.

Existing Boundary Correction							
	Acres						
	4,771	Acreage of existing boundary, documented since establishment in 1974					
subtotal	30	Correction of 30 acres for existing boundary based on use of current GIS technology					
Acquired Expansion Parcels – owned and managed by the Reserve outside of the existing NERR boundary							
Acquisition Name	**Acres ***	**Legal Description**	**Tax Lot**	**Year Acquired**	**Seller**	**Funding Source**	**Primary Habitat**
North Creek Headwaters	2.3	T26S-R14W-S23	700	2008	Sebesta	PAC Gustafson Estate	Uplands, Developed
Hidden Creek Headwaters	1.5	T26S-R14W-S23	900	2008	Burbee	PAC Gustafson Estate	Uplands

Acquisition Name	Acres *	Legal Description	Tax Lot	Year Acquired	Seller	Funding Source	Primary Habitat
Wasson Creek Headwaters	672.5	T26S-R14W-S22, 34	100, 1000, 1800, 200, 400, 500, 800, 900	2011	Plum Creek Timber Co.	CELCP Gustafson Estate	Uplands
Salal Lane Uplands	445.6	T26S-R14W-S10, 11, 14, 15	300, 400, 600, 700, 1200, 1600, 1900, 2000, 2800, 2900, 3000	2011	Roseburg Timber Co.	CELCP Gustafson Estate	Uplands
Indian Point	417.4	T26S-R14W-S11, 12, 13, 14	100, 400, 500, 600, 1200, 1300	2014	Westbrook Family, Bank Owned	NCWCP Gustafson Estate	Uplands, Wetlands
Entrance Property	1.03	T26S-R14W-S26	100	2021	Coos County	PAC/DSL/FOSS	Uplands, Developed
Block Property	0.67	T26S-R14W-S26	500, 600	2022	Block	FOSS	Uplands, Developed
subtotal	1,541	Acres of acquired expansion parcels					
subtotal	200	Acres of South Slough waters to high water line connecting acquired expansion parcels					
Total Expansion	**1,771**	**Acreage of proposed expansion area**					
	6,542	**Acreage of proposed new boundary: 4,771 existing acreage + 1,771 expansion area acreage**					
Potential Future Acquisitions and Trades							
Acquisition Name	**Acres ***	**Legal Description**	**Tax Lot**	**Year Acquired**	**Seller**	**Funding Source**	**Primary Habitat**
Winchester Uplands	76	T26S-R14W-S36	800	TBD	State of Oregon	TBD	Uplands
Deal Property	29	T27S-R14W-S2	203Z1	TBD	Coos County	TBD	Wetlands
Entrance Expansion Area Trade[+]	0	T26S-R14W-S26	100, 700	TBD	Private Landowner	TBD	Upland forest, grassland
Subtotal	105	proposed future acquisition acres					
	6,647	**Acreage of potential future boundary if potential acquisitions are completed**					

*****Acres are calculated in GIS and differ from tax lot information and/or property line surveys.*

[+]*Potential land trade would result in no net change in acres. See Figure 2.3.*

Table 2.1: Details of SSNERR expansion proposal and potential future acquisition alternative

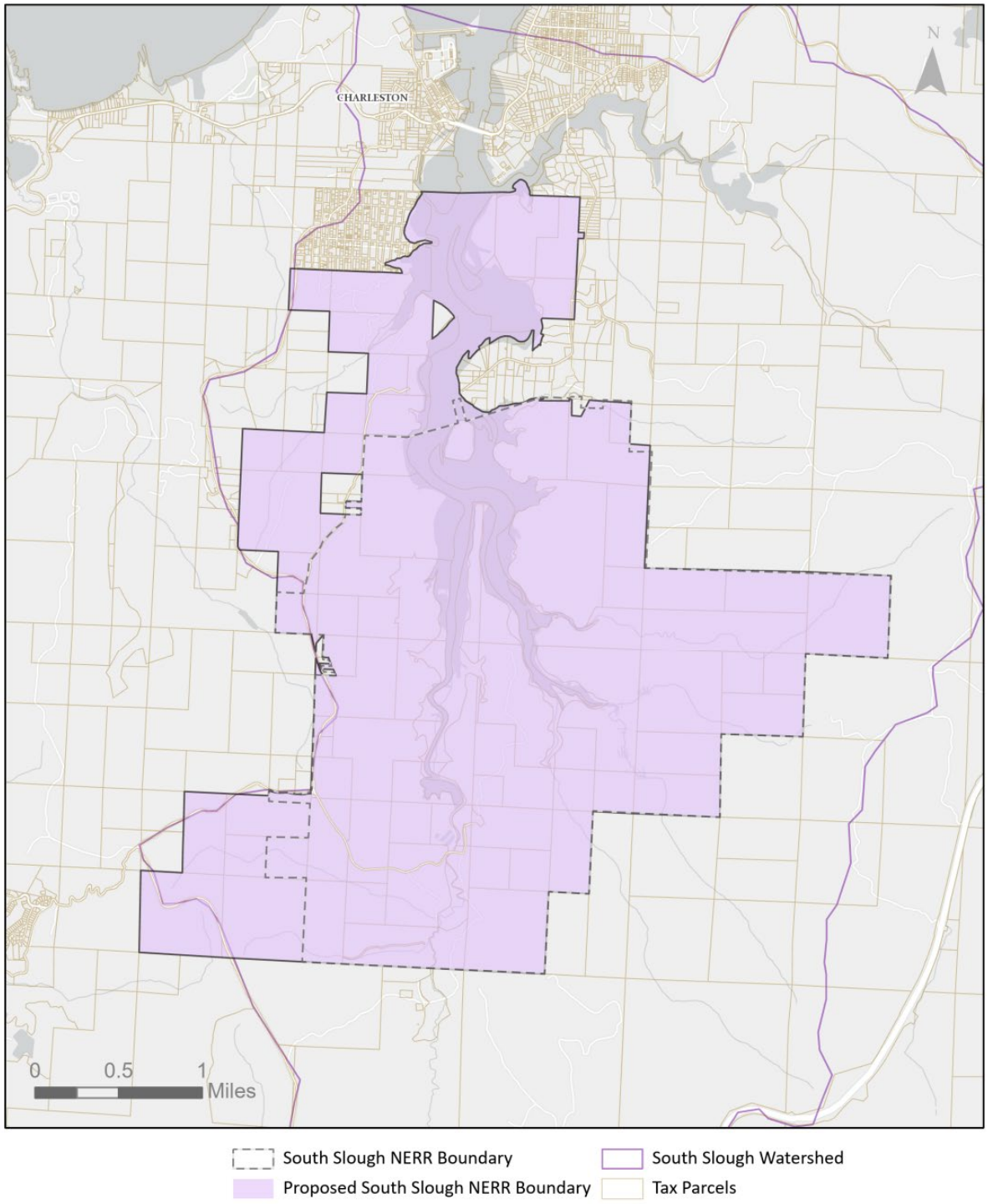


Figure 2.1: Map of South Slough National Estuarine Research Reserve with Proposed Boundary Change

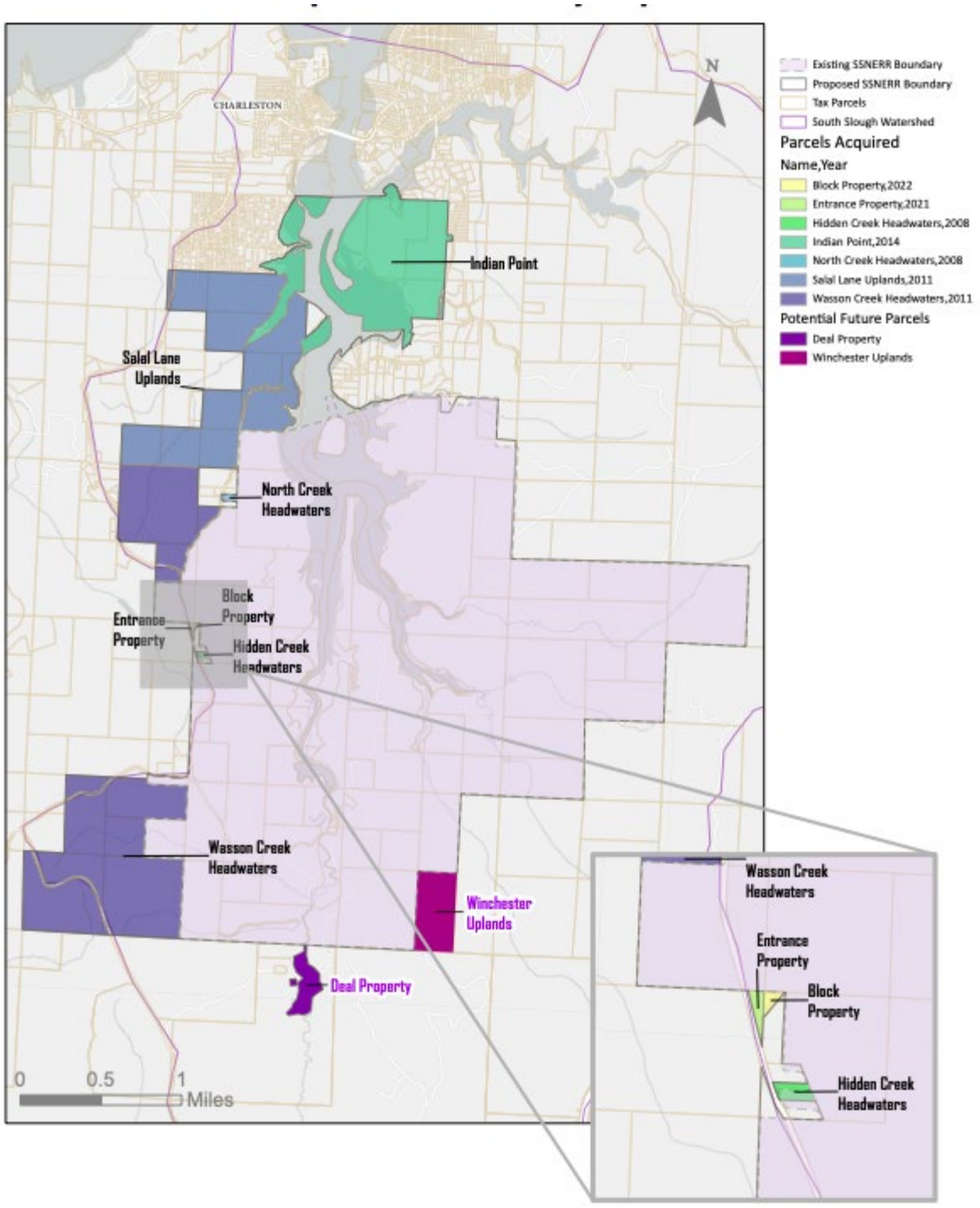


Figure 2.2 Map of Proposed Boundary Change with Labeled Parcels

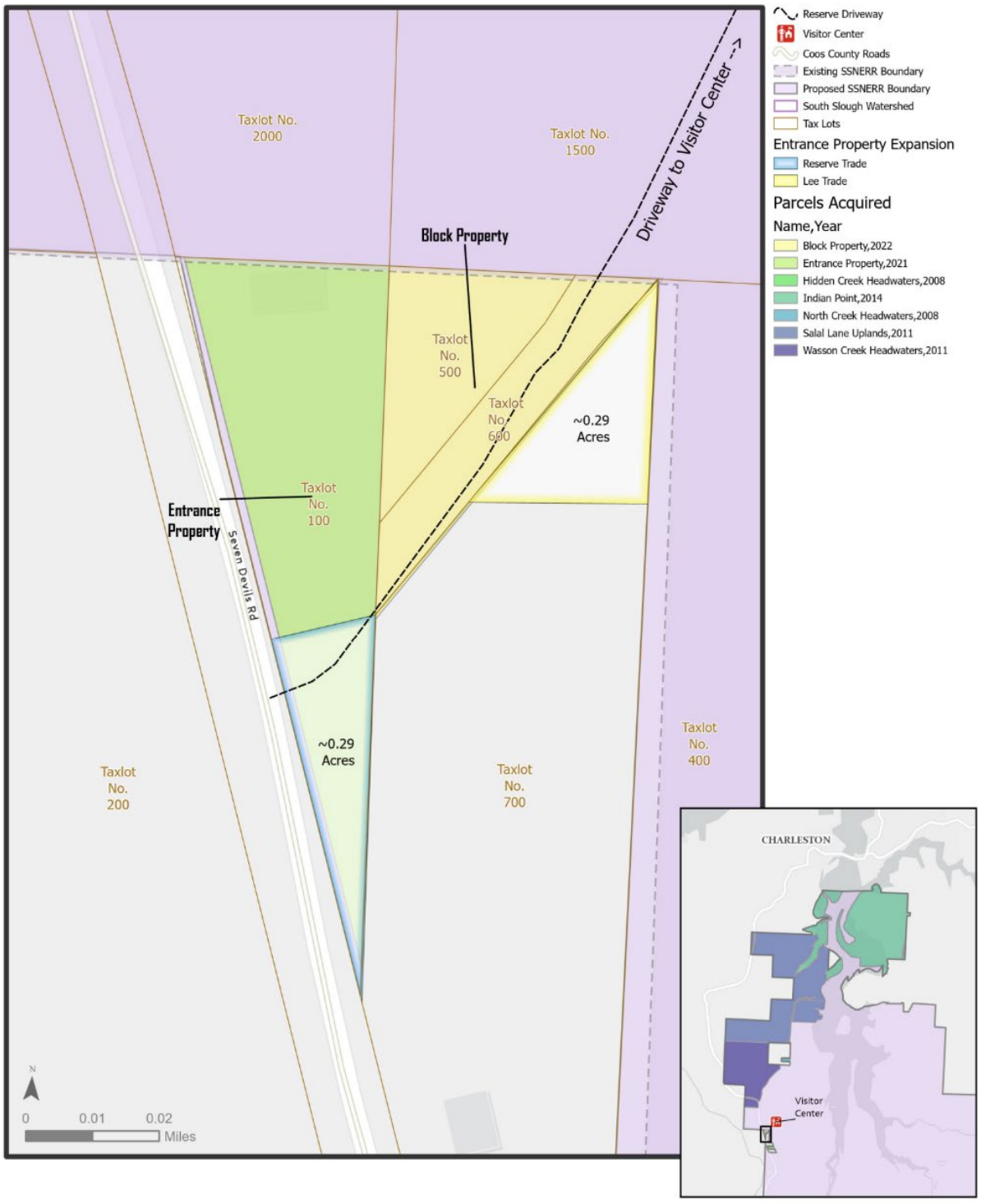


Figure 2.3 Map of Proposed Entrance Property Expansion (Alternative 2B)

2.2.1 Description of Specific Parcels

2.2.1.1 Parcels in Boundary Alternative 2

North Creek Headwaters is a 2.3 acre parcel of second growth conifer upland located along Salal Lane next to other residential lots.

The Entrance parcel, a 1.03 acre plot of land acquired in 2021, and the Block parcel, a 0.67 acre plot of land acquired in 2022, add land to the entrance of the SSNERR.

Hidden Creek Headwaters is a 1.5 acre parcel located along Seven Devils Road near the entrance to the Reserve Visitor Center. The acreage is second growth conifer forest and disturbed pasture grass. There is also a concrete pad at the former location of a shop building located on the property.

Wasson Creek Headwaters parcels were purchased from Plum Creek Timber Company. These parcels are predominantly composed of young, overly dense forested uplands. All parcels have been logged within the last 30 years and most of them have been logged multiple times. Of the 673 acres, over 640 acres are evergreen forest and approximately 25 acres are palustrine forested wetland, mostly located in riparian areas.

Salal Land Upland parcels were purchased from Roseburg Resources, a timber production company. These parcels are predominantly composed of young, overly dense forested uplands. All parcels have been logged within the last 30 years and most of them have been logged multiple times. Of the 446 acres, over 270 acres are evergreen forest, over 125 acres of mixed forest, approximately 20 acres are palustrine forested wetland (likely located in riparian areas), 3 acres are estuarine emergent wetland, and 9 acres are unconsolidated shore.

Indian Point was bought at auction from the bank. Most parcels were logged in the late 1990's while the entire tract has been logged at least once in the past. The area was slated for high density residential development until a Land Use Board of Appeals zone change was denied in the early 2000's. Remnant roads cover part of the property. The 417 acres is primarily dense mixed conifer forested upland, but also includes estuarine intertidal aquatic bed, intertidal emergent wetland, and there limited unconsolidated shore.

2.2.1.2 Parcels in Boundary Alternative 2B

The Deal Property is owned by Coos County and comprises approximately 29 acres of lowland pasture (former wetland), plus a surrounding forested buffer. The property is bisected by Winchester Creek, the primary freshwater source for South Slough, and therefore provides a valuable opportunity for the restoration of wetland, in-stream, and riparian habitat downstream from the only Coho salmon spawning reach in the South Slough watershed.

Winchester Uplands comprises approximately 76 acres of mature upland forest habitat adjacent to the southeast corner of the SSNERR. This property is owned by the State of Oregon and managed by DSL as an asset to the Common School Fund. This parcel supports habitat for the endangered marbled murrelet, limiting the potential for timber revenue; therefore, there is strong

support within DSL for SSNERR to purchase the property and bring it into the SSNERR boundary for long-term conservation.

Entry Property Expansion Area is approximately a quarter of an acre of mature forest close to the Entrance Property, which is the Reserve's driveway to the visitor center (Figure 2.3).This property is owned by a private landowner. The SSNERR currently anticipates acquiring this property by exchanging with the private landowner a similar sized portion of grassland in the current Entrance Property that is managed as a buffer along a county road. The private landowner plans to construct a private access road on the edge of this grassland parcel. Because the exchange is for equal sized parcels, there is no net gain or loss of acreage to the SSNERR.

2.2.2 Proposed Management of Acquired Parcels

If the expanded area is included in the boundary, the SSNERR is eligible to receive Federal funds to assist in the operation and management of the area 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 MP and to take the necessary steps to ensure the continued effective operation of the Reserve. As noted above, SSNERR is currently operating under an MP approved by NOAA in 2017, extending to 2022.[2] The acquired properties will be managed consistent with the 2017-2022 MP.

Once an acquisition is under Reserve management, Oregon's management policy for the Reserve, as mandated in O.R.S. 273.553, maintains the protection of the acquisition. The Oregon Administrative Rules that govern the formal Reserve also guide the management of the acquisition. The Oregon Department of State Lands also classifies the lands under Reserve management as "Special Stewardship Lands" to ensure they are managed for purposes that align with the Reserve's mission.

Under NERRs regulations, Reserve boundaries encompass two areas: key land and water areas (or "core area") and a buffer zone. 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 term *buffer zone* refers to an area adjacent to or surrounding key land and water areas that protect the core area and provide additional protection for estuarine-dependent species, including those that are rare or endangered.

The additional parcels will be managed consistent with the existing NERR, with estuarine waters, lowlands, and wetlands designated as core areas for the Reserve. Riparian corridors are also managed as core areas. The buffer is primarily forested uplands. Although the Reserve considers the entirety of Reserve lands as "core" to programs and habitat protection, the forested uplands provide considerable buffer to the lowlands and estuarine waters.

Within the current boundary, the upland buffer includes the Interpretive Center and most of the Reserve's trails.

[2] Available at https://coast.noaa.gov/data/docs/nerrs/Reserves_SOS_MgmtPlan.pdf (last visited 4/28/23)

While the Reserve is open to the public, certain activities must be limited or restricted to maintain the mission and purpose of the Reserve. For example, the removal of natural resources (including minerals, forest products, and wildlife) is either entirely limited or limited by volume, to reduce the human impact on natural processes and the research and educational programming that is based thereon. The commercial extraction of natural resources is prohibited entirely since it does not align with the goals or objectives of the Reserve. One potential exception to this limitation is the removal of natural resources for the purposes of ecological restoration, in which case commercial revenue is not generated but directly invested back into the mission-driven project and programming itself. Other uses that are restricted due to their potential adverse impacts on ecological processes, human safety, research, or education programming include off-road vehicle use, target and pleasure shooting, horseback riding, and hunting in certain areas of the Reserve (See Figure 7.1 in the 2017-2022 MP). These restrictions will apply to the expanded areas.

In the expanded area, recreational activities like hunting, hiking, harvesting of shellfish, mushrooms, berries, are anticipated to be allowed to continue. These areas do not currently contain improved trails, but there are some gated, decommissioned roads people use as walk-in access points that the NERR does not currently plan to restrict.

The NERR intends to conduct habitat restoration projects within the expanded area, when funds are available, consistent with the types of projects currently underway in the current boundaries. One type of restoration project that will likely be conducted in the expanded area is density thinning in upland areas of the expanded area. As an example of such a project, one recently planned project is the ridgetop-to-estuary restoration plan for the Wasson Creek Watershed Restoration Project. The Wasson Creek Watershed supports populations of several estuarine-dependent fish species, including salmon, and has the potential to provide habitat for listed species like the marbled murrelet. The Wasson Creek was damaged by timber harvest and its floodplain converted to pasture and crop lands, resulting in fractured stream and floodplain connectivity, and diminished fish habitat. The Wasson Creek Watershed Restoration Plan is a ridgetop-to-estuary project that includes variable density thinning in the uplands to create more availability to resources such as light, water, nutrients and space to understory vegetation, In the lowlands, the Reserve will engage in Stage 0 restoration to establish site conditions to allow natural processes (the power of surface water hydrology, sediment deposition, large wood recruitment, and beaver activity) to do virtually all the work establishing self-forming wetlandstream complexes. Methods include plantings of native trees, shrubs and grasses; removing invasives; installing Beaver Dam Analogs (BDAs); grading and excavation of a small fish passage channel in existing man-made ditches; plantings in riparian buffers; and building boardwalks.

The NERR will also conduct research and monitoring in the expanded areas consistent with the 2017-2022 MP. The NERR sponsors applied research projects that focus on evaluation of the effects of human disturbance on the South Slough NERR and other estuarine habitats, including:

- Analysis of input vectors that facilitate introduction of non-indigenous species into the South Slough estuary;

● Non-point source pollution and discharge into estuarine tidal creeks;

● Ecological consequences of oil spills and other hazardous material discharges in the estuarine environment;

● Effects of upstream forest practices on estuarine habitats and communities;

● Ecological role of commercial oyster cultivation on native eelgrass, sediments, invertebrates, and fish;

●Effects of freshwater withdrawals on community dynamics in estuarine tidal channels

● Ecological influence of seafood processing wastewater within tidal channels

● Long-term effects of landfill runoff on estuarine tidelands

● Influence of docks and marinas on migratory behavior of anadromous fish

● Ecological assessment of the habitat values of diked wetlands;

● Experimental evaluation of restoration and enhancement techniques for tidal wetlands;

● Empirical assessment of biological and economic advantages during active and passive restoration of degraded estuarine habitats;

● Characterization of site-specific performance standards for natural and historically-altered tidal wetlands; and

● Economic valuation of estuarine habitats and ecological services.

Chapter 3 Affected Environment

Consistent with NEPA requirements, this chapter describes the physical, biological, and social and cultural resources affected by the alternatives presented in Chapter 2, including resources in both the current SSNERR boundary and the expanded SSNERR boundary. The information in this section, together with other information in this document, provides the basis for NOAA's evaluation of the potential environmental impacts of the expansion alternatives as described in Chapter 4 (Environmental Consequences). The scope of the environmental impacts addressed in this Environmental Assessment includes those direct, indirect, and cumulative effects on the physical environmental (air quality and climate, geology and substrates, and water), the biological environment (living marine resources and protected species) and the cultural and human environment (cultural and historic resources, and socioeconomics).

3.1 Physical Environment

3.1.1 Air Quality

The Clean Air Act (CAA) of 1970 requires states to adopt air quality standards. The standards were established to protect the public from potentially harmful amounts of pollutants. The U.S.

Environmental Protection Agency (EPA) has established primary and secondary air quality standards. EPA has set National Ambient Air Quality Standards (NAAQS) for the following six criteria pollutants: ozone (O_3), nitrogen dioxide (NO_2), carbon monoxide (CO), sulfur dioxide (SO_2), lead (Pb) and particulate matter (PM-2.5, PM-10).

In general, the air quality in the area around SSNERR is "good" to "moderate," meaning the air quality index (AQI) is between 0 and 50, and at times, 50-100. AQI is measured on a scale of 0 to 500, and addresses pollutants including ozone and particulate matter (PM-2.5). There are 46 air quality monitoring stations throughout the state. The station in the closest vicinity of South Slough (Coos Bay Station) lists PM-2.5 as the primary pollutant in that area (AirNow, ORDEQ).

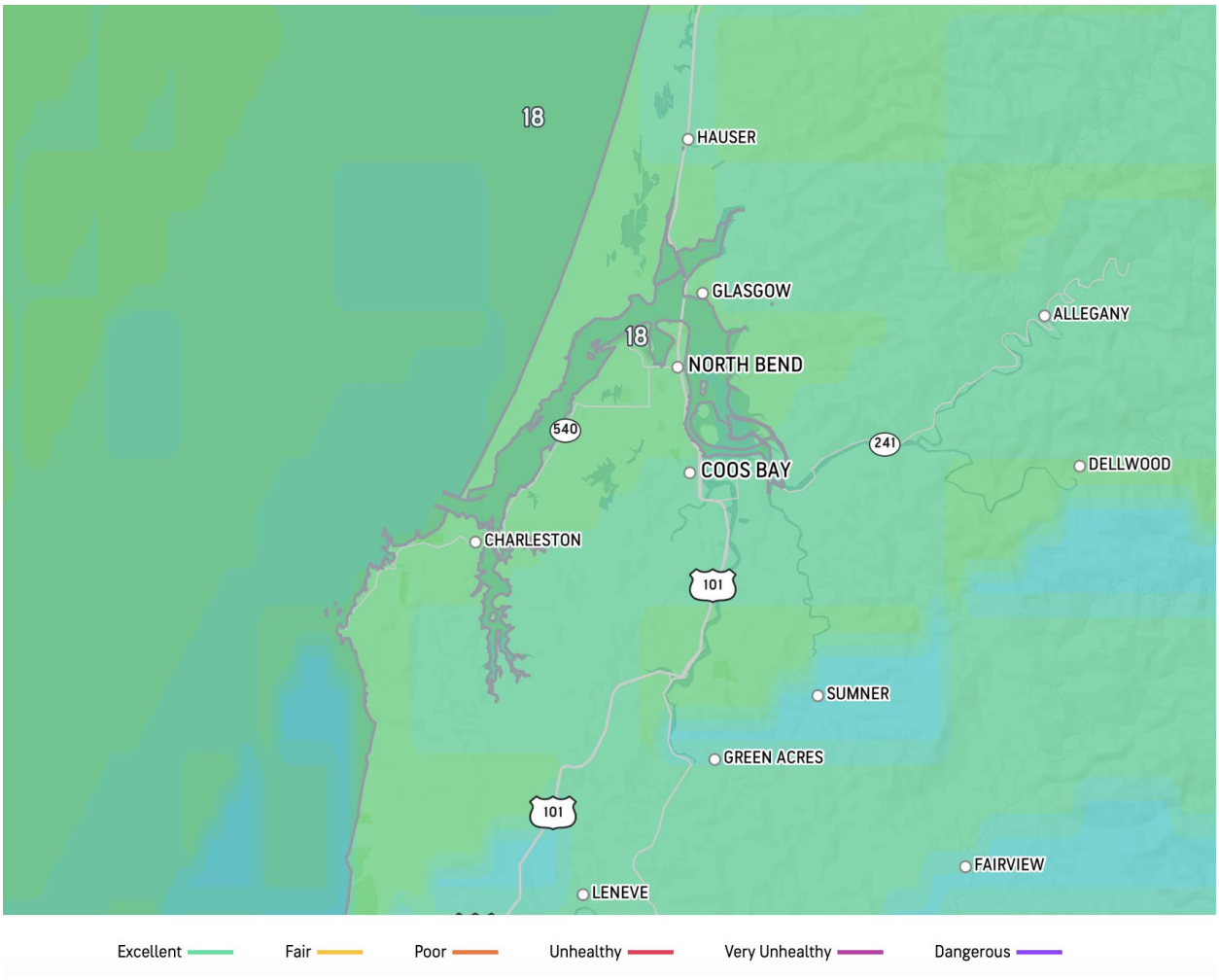


Figure 3.1 Air Quality in South Slough Region

Of the six criteria pollutants monitored by the EPA, the pollutant of primary concern in Oregon is PM2.5. PM2.5 is airborne particulate matter measuring 2.5 micrometers or smaller and commonly includes a range of dust, dirt, ash, soot, chemicals, metals and vapors. The microscopic particles enter the circulatory system and circumvent internal defenses, causing a wide range of short- and long-term health effects. Exposure to PM2.5 has been definitively

linked to health effects such as heart and lung disease, respiratory infection, lung damage, cancer, and even early death.

PM2.5 levels typically fluctuate based on season. During winter, PM2.5 levels rise as households burn wood for domestic heating. Air quality in Oregon ranging from "moderate" to "unhealthy for sensitive groups" is common in most urban areas from November to February. Wildfires present another major, and growing, source of PM2.5, particularly in the late summer and early fall months. For example, Oregon cities experienced higher all-around pollution levels in 2017 and 2018 (compared to 2019) as a result of severe wildfire seasons. As dry conditions and hot temperatures continue to rise, Oregon's fire risk has increased. Other factors have contributed to the issue, such as an accumulation of forest undergrowth, steep mountains, and strong winds. Together, these factors have resulted in historic wildfires in recent years, notably in 2017 and 2020.

3.1.2 Greenhouse Gas Emissions and Effects of Climate Change

There are two cyclic climate phenomena that affect the SSNERR. The El Niño Southern Oscillation occurs every two to seven years and causes an increase in ocean temperatures and a decrease in precipitation, though it can sometimes lead to more powerful winter storms and subsequent flooding. The Pacific Decadal Oscillation experiences both positive and negative phases which switch every few decades. Locally, a positive phase results in warmer ocean temperatures, and a negative phase results in cooler ocean temperatures. Climate change impacts in Oregon include warming air temperatures, increasing acidity in nearshore marine waters, increased storminess, and increasing water temperatures. Precipitation and atmospheric weather patterns are also changing. Sea-level rise rates are slower in Oregon than other parts of the country, but Oregon's coast, particularly the central coast, is experiencing sea level rise every year. The coming years will bring higher tides, and more inundation of coastal communities. The estimated long term rate of coastal wetland loss, due to rising seas, is greater for the Pacific coast than any other areas of the U.S.

The Oregon coast is vulnerable to many climate-related changes, particularly sea level rise and changes in ocean acidity (pH). In the Coos Estuary, the fate of built environments (e.g. roads, hardened shorelines) and ecosystems (e.g. tidal wetlands, eelgrass beds) is unknown as sea levels change. An increase in sea level may influence habitat and species distributions as well as infrastructure, which concerns commercial economies, coastal accessibility, and human safety. Decreasing ocean pH (acidification) is also a local concern, as it has serious implications for water quality, shellfish industries, and ecosystem services. Ocean acidification has already had noticeable effects in the Pacific Northwest, including impairment of shellfish production in Netarts Bay and Willapa Bay.

The SSNERR and its surrounding area in particular ranked very high on social sensitivity to climate change impacts, but also ranked high in ecological resilience. The high social sensitivity ranking stems from the area's low per capita income and other socioeconomic barriers, including dependency on natural resource extractive industries. This dependency may limit the community's ability to rapidly respond to climate impacts as they occur.

The NERR has a robust research program to assess the effects of climate change in the reserve. Projects including assessing the effects of climate change on tidal wetlands and wetland groundwater levels, emergent marshes, eelgrass beds, and forested wetlands; studying ocean acidification by collecting and analyzing pCO2 and pH data throughout the reserve; and evaluating potential effects of changing water quality (i.e. pH, water temperature) and sea level rise on local biota, including native fish and shellfish. The site also works with partners, including the Pacific Northwest Coastal Blue Carbon Working Group, to quantify carbon stocks, sequestration rates, greenhouse gas emissions and ecosystem drivers in estuarine habitats.

3.1.3 Water Resources and Quality

In the SSNERR and surrounding estuary, including the proposed expansion parcels, heavy winter precipitation results in large volumes of fresh water and sediment inputs during and after storms. In the South Slough watershed, six perennial streams and more than 30 intermittent streams provide highly-seasonal freshwater flows. Winchester Creek is the slough's largest tributary stream.

The influence of salt water in the slough is more pronounced during summers when freshwater input is low. Tides are mixed and follow a semidiurnal pattern with two high tides and two low tides per day.

In South Slough waters, salinity, specific conductivity, nutrients, and chlorophyll concentrations vary greatly along the salinity gradient; nutrients and chlorophyll concentrations are at generally healthy levels. Water temperature, oxygen, and acidity are less responsive to changes in salinity, and are also at healthy levels in the SSNERR. Water quality analyses show a significant increasing trend in pH over the last 10 years at all SWMP stations in the South Slough, although over the last four years pH has been decreasing (2010; ongoing). Additional habitats in the SSNERR include freshwater ponds and marshes, a few isolated wetlands exist in the uplands, and salt marshes. Reserve investment in wetland restoration over the years has increased salt marsh coverage in the SSNERR.

The South Slough estuary receives a variety of direct point and nonpoint source pollutants. Point source water pollution ranges from that generated by waterside businesses in Charleston (e.g. fish processing plant outfalls) to occasional actions by private individuals along the shoreline or aboard boats. Nonpoint source pollutants enter the estuary indirectly as components of road runoff and runoff from rural and urban activities and industrial sites. Though commercial timber harvesters try to be conscious of their impact on the environment, the Reserve experiences stressors associated timber harvesting, including contamination by herbicides and pesticides, and sedimentation.The North Bend Water Board supplies drinking water throughout Coos Bay from reservoirs on Pony Creek and Joe Ney Slough. The board's right to water from Winchester Creek is senior to the Reserve's right to keep water in the stream to protect fish. In 2013, the board informed the Reserve Management Commission that it intended to seek additional sources of fresh water to meet growing residential and commercial demand; it may exercise its right to water from Winchester Creek if other sources prove unfeasible.

The NERR has a number of research programs relevant to water quality, including the study of acidification mentioned above, and research evaluating potential effects of changing water

quality (i.e. pH, water temperature) and sea level rise on local biota, including native fish and shellfish.

3.1.4 Geology and Substrates

The South Slough watershed lies along a geologic syncline, or fold. Due to this formation, the slough's eastern and western slopes are of distinct geologic types. The eastern shore formation is typical of the Coos watershed, and is composed of highly-erodible Quaternary marine terraces of unconsolidated to semi-consolidated sand, silt, and clay. The terraces slope gently and are worn down along creek beds to sandstone and siltstone. The western side's Empire Formation, with scattered Quaternary marine terraces, is composed of hard impermeable sandstone. The slopes are mantled with sand, silty loam, and loamy sand.

Tidal waters of the Coos Estuary are contained largely within a deltaic sedimentary basin of late Eocene Coaledo Formation bedrock. Claystone, siltstone, and cross-bedded sandstone layers that make up the Coledo Formation occur in sequence along with other sedimentary rocks in the lower reaches of the estuary, and in several rocky outcrops that occur near the estuary mouth and above the end of the navigation channel. The oldest layer is a cross-bedded tuffaceous claystone mixed with conglomerate mudstone pebbles. The thin-bedded siltstone (middle) layer was formed by deposition in deep ocean water during the maximum transgression of the sea, probably as much as 180 m below present sea level.

The upper layer is a coarse to fine-grained sandstone with poorly-rounded mudstone blocks. The Coledo Formation layers are severely deformed and overlaid by younger strata including the fine-grained Bastendorf Formation shales (late Eocene), sandy Miocene fossil beds, and Empire Foundation sandstones (Pliocene). Sediments in the estuarine tidal channel vary from coarse-grained sand in the lower estuary to fine grained sand and silts in the upper channel. Landforms surrounding most of the shoreline of the Coos Estuary are composed primarily of uplifted Quaternary marine terraces capped with marine deposits.

Soils

Soil in the South Slough watershed and estuarine tidal basin are derived from several sources including terrestrial runoff, oceanic deposition, and biotic origins. Relatively shallow soils have formed within the sediments throughout the watershed landscape, and the rounded hills, ridges, and valleys have moderate to steep slopes (10-60 %) that are prone toward erosion and periodic landslides. The mosaic of different substrata units typically appear as a complex of mineral and organic soils that occur in close association with geomorphic and hydrographic features such as stabilized hillsides, eroding banks, stream beds, flood plains, toe slopes, and terraces. Sediments exposed on the low hills of the Coos watershed are primarily soft, loamy soils of the Templeton-Salander group, and sandy marine terraces of the Bullards-Bandon Blacklock group. Soils exposed on the steep eastern hillsides are primarily deep gravel and loam soils of the Preacher-Bohannon group.

3.1.5 Habitats

The South Slough Estuary contains several different types of intertidal and subtidal habitats that are occupied by a wide diversity of biotic assemblages. The spatial mosaic of habitats results

from the interaction of several physical variables, including location along the estuarine gradient, substratum and energy regime, intertidal elevation and topography, and the extent of tidal influence (Figure 3.2, 3.3). The spatial distribution of habitats and the composition of biotic communities is also dependent on several biotic variables, such as the physiological tolerances of the organisms to desiccation, thermal heating, exposure to fresh and saline water, episodic burial by sediments, predation, competition, recruitment, and a suite of other biotic stressors.

There are four distinct geomorphic zones and eight major types of estuarine habitats within the South Slough. First, the Marine - Estuarine Interface Zone is located immediately outside the mouth of the South Slough Estuary and includes the lowermost region of the Coos Estuary and the nearshore region immediately outside the jetties. During rainy periods when river discharge is high, the Marine - Estuarine Interface Zone can be expansive and extend outside the jetties in the form of an estuarine plume that extends into the sea as far south as Gregory Point and northward along the shoreline of North Spit. During the dry season the Marine - Estuarine Interface Zone is relatively small and confined to the lower region of Coos Bay where mixing occurs with the daily ebb and flood of the tides.

Second, the Marine Dominated - Lower Zone is located immediately inside the mouth of the estuary (Charleston / Barview Wayside) southward to Valino Island. The Marine-Dominated zone is characterized by high variability in salinity. Further up the estuary, the third geomorphic zone (Middle Estuary – Mesohaline Zone) is located from the tip of the Long Island Peninsula southward to the Kunz marsh (Winchester Arm) and to the confluence of Talbot and John B. Creeks (Sengstacken Arm). The mixing zone is characterized by waters with a salinity range of 5 to 28 Practical Salinity Units (psu). Fourth, the Upper Estuary - Riverine Zone is located primarily along Winchester, Elliott, Talbot, and John B. Creeks to the head of tide. Salinity typically ranges from 0 to 22 psu and is characterized by seasonal and episodic inputs of freshwater.

Eight major estuarine habitats occur within the South Slough Estuary (Table 3.1 below). These primary habitat types and their associated assemblages of organisms are summarized below:

Habitat Type	Associated Organismal Assemblages
Open Water and Estuarine Water Column	• Phytoplankton and Protist Communities: Bacteria, Flagellates, Diatoms • Neustonic Layer: Decapod megalopae • Zooplankton Communities: Copepods, Decapod zoeae, Hydromedusae • Midwater Fish: Herring, Perch, Anchovy, Smelt, Searun Cutthroat Trout
Tidal Channels and Drainage Creeks	• Plankton Communities: Diatoms, Copepods, Hydromedusae • Oysters, Crabs and Shrimp: Ostrea, Cancer, Heptacarpus, Crangon • Resident Fish: Perch, Sculpin, Stickleback • Anadromous Fish: Cutthroat trout, Chinook, Coho salmon
Submerged Aquatic Vegetation	• Eelgrass: *Zostera marina, Zostera japonica* • Macroalgae: *Ulva, Enteromorpha, Chaetomorpha*
Sandflats and Mudflats	• Infaunal Invertebrates: Polychaetes, Amphipods, Clams
Bioturbated / Burrowing Shrimp Beds	• Ghost shrimp: *Neotrypaea californiensis* • Mud shrimp: *Upogebia pugettensis*
Salt Marshes	. Emergent Plants: *Deschampsia, Triglochin, Carex, Salicornia*
Bedrock, Gravel, Cobble, and Miscellaneous Hard Substrata	. Sessile Invertebrates: Barnacles, Mussels, Boring clams . Motile Invertebrates: Shore crabs, Porcelain crabs
Anthropogenic / Constructed Habitats	. Hardened Structures, Rip-rap and Jetties: Barnacles, Seaweed . Docks, Marinas and Pilings: Barnacles, Seaweed, Isopods, Seastars . Commercial Oyster Reefs: *Crassostrea gigas*

Table 3.1: Major Estuarine Habitats and Associated Organismal Assemblages in the South Slough Region

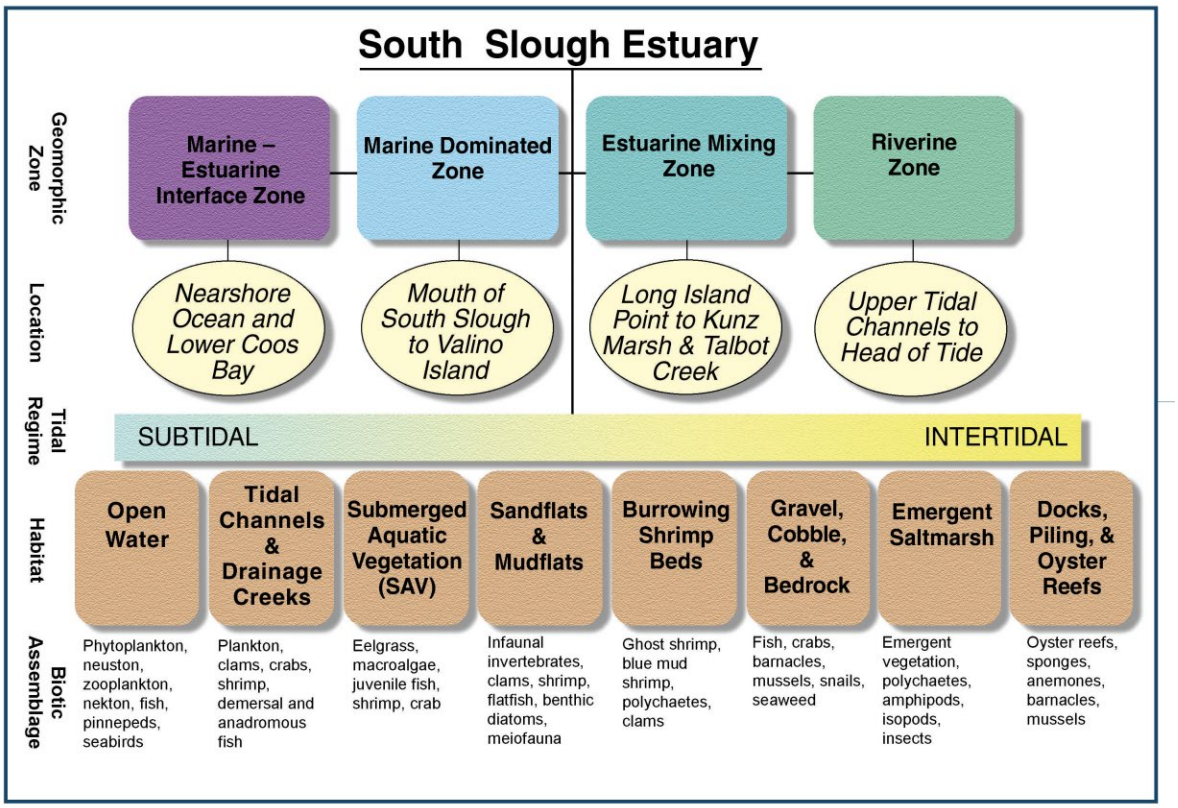


Figure 3.2: South Slough Estuary Habitat Zones and Associated Organismal Assemblages (Site Profile)

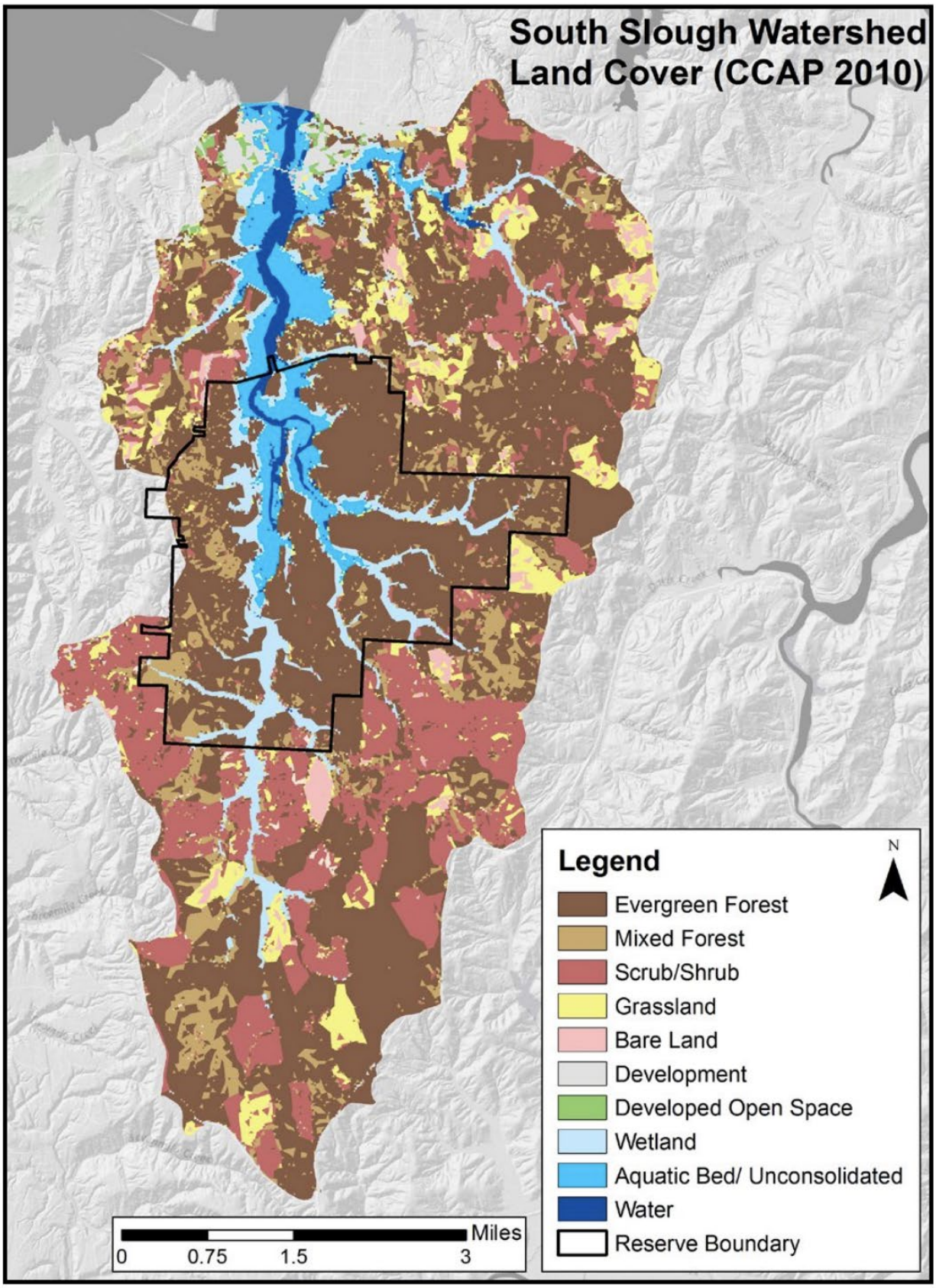


Figure 3.3: South Slough Land Cover Types

Essential Fish Habitat:

Essential Fish Habitat (EFH) was defined by the U.S. Congress in the 1996 amendments to the Magnuson-Stevens Fishery Conservation and Management Act (Magnuson-Stevens Act) as "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity." Implementing regulations clarified that waters include all aquatic areas and their physical, chemical, and biological properties; substrate includes the associated biological communities that make these areas suitable for fish habitats, and the description and identification of EFH should include habitats used at any time during the species' life cycle. EFH includes all types of aquatic habitat, such as wetlands, coral reefs, sand, seagrasses, and rivers. The main purpose of EFH regulations is to minimize the adverse effects of fishing and non-fishing impacts on EFH to the maximum extent practicable. The National Marine Fisheries Service (NMFS) works with the Pacific Fishery Management Council to designate EFH in the region that includes the SSNERR.

The Pacific Fishery Management Council's approved role in managing fish habitat includes designating and updating EFH and identifying Habitat Areas of Particular Concern (HAPC), which are a subset of EFH that highlight especially important habitat areas or types. The Pacific Fishery Management Council has listed over 100 managed species, and has identified five HAPC types: estuaries, canopy kelp, seagrass, rocky reefs, and "areas of interest." Areas of interest can include a variety of submarine features, such as banks, seamounts, and canyons.

Review of the EFH Mapper Tool can be used to identify the presence of EFH and HAPCs in the South Slough. According to the NOAA EFH tool, there are four EFH and two HAPC designations in the waters surrounding the SSNERR (Figure 3.4). The four EFH species were Groundfish, Chinook Salmon, Coho Salmon, and Coastal Pelagic Species. The two HAPCs were for Estuaries and Seagrass.

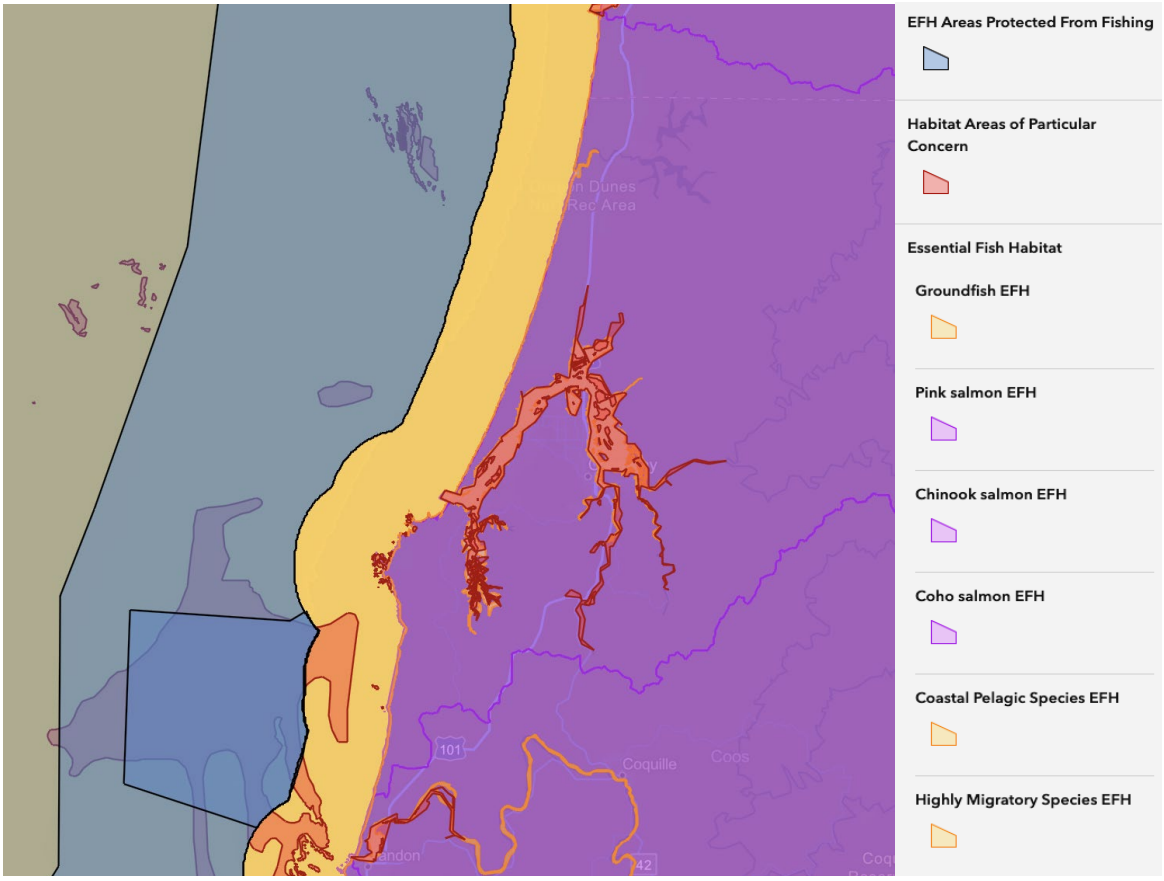


Figure 3.4 EFH and HAPC Designations in the South Slough Region

Terrestrial Habitats in the SSNERR:

The South Slough watershed is dominated by steep, forested slopes and defined on the east, south, and west by prominent ridges with numerous small streams draining into South Slough. Major sections of the estuarine shoreline are bounded by sandy bluffs. The southern half of the watershed, beyond the SSNERR boundaries, contains the springs and creeks which feed Winchester Creek, the slough's largest tributary stream. The northern administrative boundary of the SSNERR crosses the South Slough immediately north of Valino Island. The rest of the boundary stair steps through the watershed; to the west is Seven Devil's Road, to the south and east are county and private forestlands.

Composition of riparian vegetation communities is shaped within coastal watersheds by the processes of fluvial and geomorphic disturbances, fire, wind, competition, herbivory, and the history of human land-use practices. Over the past century, land-use disturbances within the riparian habitats of the SSNERR have included removal of overstory vegetation, anthropogenic fires, establishment of road systems, logging dams, and modification of riparian zones for agriculture and grazing. Most riparian areas within the SSNERR have been disturbed by full or partial removal of overstory vegetation for over years. Drainage systems have been modified for livestock grazing by channelization of the streambed, construction of drainage ditches and earth

dikes, and installation of tide gates. These land use modifications provide historical context for development of riparian floral and faunal communities within the SSNERR.

Riparian habitats within the SSNERR are dominated by stream reaches characterized by stands of hardwood trees, mixed conifer and hardwood forests, and open-canopy freshwater marshes. (Open canopies are forested areas with a density that allows sunlight to shine through and vegetation to grow below, and closed canopy has a higher density and less sunlight, but provides cover for wildlife.) Conifer-hardwood cover types encompass nearly 50 % of the riparian areas surveyed within the SSNERR, and exclusive hardwood cover accounts for over 20 % of the surveyed area, 156 plots of the SSNERR, studied by Denike *et al.*, (1992). Over 25 % of the riparian habitats are composed of freshwater marshes. Riparian habitats that contain exclusively coniferous trees, pasture-grasses, and brush make up less than 8 % of the total riparian areas within the SSNERR. Conifers and deciduous trees dominate the riparian valley floors in the SSNERR. Red alder (*Alnus rubra*) and Sitka spruce (*Picea sitchensis*) are the most frequently encountered overstory species in the riparian habitats. Sitka spruce are abundant along the banks of higher-order streams at locations that are low within the watershed sub-basins. In contrast, red alder is much more common in the middle reaches and tributaries where it contributes twice the basal area of Sitka spruce, four times the basal area of western hemlock (*Tsuga heterophylla*), and an order of magnitude greater basal area than the other species of trees.

Significant portions of stream bank terraces and floodplains in riparian zones of the Oregon Coast Range are devoid of trees and exist as bank habitats that are dominated by shrub vegetation. Dominance of tall shrubs in the Coast Range riparian forests represents an important biotic control mechanism that regulates the composition of herb communities and tree regeneration. Seventeen species of shrubs were identified in the eight riparian systems surveyed by Denike et al. (1992) within the SSNERR. This level of species richness for shrubs is comparable to observations for other locations in the Oregon Coast Range. Riparian shrub communities within the SSNERR are dominated by salmonberry *(Rubus spectabilis*), and this species is present in over 70 % of forested riparian areas.

Two major upland pathogens serve as stressors to trees in the SSNERR. Swiss needle cast is caused by a fungal infection (*Phaeocryptopus gaeumannii*) in Douglas-fir (*Psudotsuga menziesii*) trees. The infection causes Douglas-fir needles to yellow and prematurely shed, reducing tree growth. Port Orford cedar root rot (*Phytophthora lateralis*) also affects the SSNERR as a non-native soil-borne pathogen, infecting Port Orford cedars (*Chamaecyparis lawsoniana*), and to a lesser extent Pacific yews (*Taxus brevifolia*). The root rot moves up the tree via evapotranspiration and kills the inner bark, often resulting in complete mortality to Port Orford cedars. Wildfire is another stressor that threatens the SSNERR. As the climate shifts to hotter and drier conditions, and unmanaged growth continues in the uplands, a wildfire originating in the SSNERR or its neighboring forest poses a potential risk to the overall health of the South Slough ecosystem, facilities, and bordering lands.

Invasions by non-native, noxious plant and animal species, including terrestrial, wetland, and aquatic species, pose a threat to the SSNERR and will continue to do so for the foreseeable future. Invasive species often enter the SSNERR as accidental passengers during human transport. Species of particular concern include gorse (*Ulex europaeus*), English ivy (*Hedera helix*), reed canary grass (*Phalaris arundinacea*), Spartina spp., and green crabs (*Carcinus*

maenas). Although some invasive species are not yet present here or occur in low numbers, the SSNERR is motivated to minimize their damaging effects early. Presence of invasive species may go unnoticed for some time, and noxious species jeopardize biodiversity, habitat quality, and the economy.

The Reserve experiences stressors to habitats associated with timber harvesting, including habitat fragmentation (upland and in-stream); contamination by herbicides and pesticides; habitat homogenization (e.g. reproduction stands); and sedimentation. The Reserve engages in research and restoration activities to enhance habitats. For more information on some of these projects, see Chapter 2.2 above, and the 2017-2022 MP.

3.2 Biological Environment

The SSNERR contains a wide variety of biotic habitats ranging from estuarine, to upland, to freshwater aquatic communities. These habitats are home to various species of plants, invertebrates, herpetofauna, birds, fish, and mammals. The biological environment is vulnerable to the same anthropogenic stressors identified in 3.1.5 (Habitats) (i.e., invasive species, nonpoint source runoff) on the physical structure and ecological functions of estuarine habitats.

3.2.1 Invertebrates

A rich invertebrate community supports the birds, fish, and marine mammals of the South Slough. Invertebrate communities that inhabit the salt marshes of the South Slough Estuary typically include oligochaetes (ex. earthworms), amphipods (crustacea, shrimp-like in form), isopods (ex. woodlice), snails, polychaetes, mites, and a variety of insects. Individuals of the introduced estuarine anemone (*Nematostella vectensis*) sometimes occur in shallow pools and wet mud within the salt marshes. Diversity and biomass of benthic invertebrates that inhabit the emergent salt marshes are low in comparison to adjacent tideflats and channels.

Meiofaunal organisms (small benthic invertebrates that live in marine or freshwater habitats) and infaunal invertebrates (aquatic animals living in the substrate of a body of water) are widespread and abundant within the soft sediment habitats of the South Slough Estuary. Aqueous muds are conducive to the formation of temporary and permanent burrows, and the sediments are mixed with an ample supply of rich organic matter. Communities of meiofaunal organisms develop trophic relationships (the ecological relationship which results when one species feeds on another) with living cells (bacteria and diatoms) and dead tissues within the sediments, and the detritus serves as a fundamental food source for diverse assemblages of infaunal deposit feeders. Invertebrate suspension feeders and mobile predatory species are also common functional group elements of the infaunal invertebrate assemblages.

Benthic invertebrate communities have not been systematically investigated throughout the subtidal channels of the South Slough Estuary. Although core samples and bottom grabs have been collected on a sporadic basis, baseline descriptive and quantitative information is lacking for the large deep burrowing bivalves, motile crustaceans, and infaunal invertebrates.

Infaunal invertebrates constitute a diverse faunal assemblage within the South Slough Estuary, and over 160 species have been recorded from the soft sediment littoral habitats. Although the

composition of infaunal communities has not been investigated in a systematic manner within the entire South Slough Estuary, it is possible to combine information from several different studies to discern spatial patterns in composition and abundance. Epibenthic invertebrates (invertebrates living on or just above the bottom sediments in a body of water) include those members of the meiofauna and small macrofauna that inhabit the sediment-water interface within estuarine tidal channels and mudflat habitats. Although they are recognized to serve an important ecological role as principal prey items for fishes and other secondary consumers, the composition, abundance, and distribution of epibenthic invertebrate communities have not been studied as a coherent functional group within the South Slough Estuary.

Distinct elements of the epibenthic invertebrate community (i.e., microcrustaceans including gammarid amphipods, tanaids, and cumaceans) have been surveyed by several investigators, but information about other elements (primarily harpacticoid copepods, leptostracans, and ostracods) is lacking. Diverse assemblages of harpacticoid copepods (benthic copepods found in freshwater and marine environment) are abundant in soft-sediment estuarine habitats in northern California, and several genera of harpacticods (i.e., *Longipedia* sp., *Harpacticus* sp., *Tisbe* spp. *Robertsonia* sp., *Heterolaophonte* spp., and others) are seasonally abundant within eelgrass beds (both *Zostera marina* and *Z. japonica*), mudflats, and salt marshes in Padilla Bay, Washington (Simenstad et al., 1988), and they are undoubtedly an important component of invertebrate faunal assemblages in other Pacific Northwest estuaries (Simenstad, 1983), including the South Slough.

Plankton

Estuarine phytoplankton are a major source of autotrophic (able to produce its own food) primary production in the open water habitats of the South Slough. Assemblages of estuarine phytoplankton are influenced seasonally and spatially by variation in ocean forcing, nutrient availability, solar energy, and riverine inputs. The typical successional pattern in Pacific Northwest estuaries begins with low densities of phytoplankton in late fall and winter (due to reduced light and high turbidity), followed by a bloom of small diatoms (single-celled algae) in late winter / early spring. The diatom bloom usually terminates in late spring when nitrogen sources are depleted, and phytoplankton densities remain low in the summer months when nutrient availability is low and grazing pressure is high. Relatively high concentrations of chlorophyll measured throughout the summer suggest that nutrient availability in the marine dominated region of the South Slough Estuary may be pulsed and tightly linked to seasonal upwelling of the nearshore ocean in the summer months.

Composition and distribution of phytoplankton communities (diatoms, dinoflagellates, and ultraplankton < 5 μm dia) varies seasonally along the South Slough estuarine gradient. Strong seasonal patterns occur within the estuarine water column for many groups, including cyanobacteria, chlorophyll dominant eukaryotes, cryptomonads, centric and pennate diatoms, autotrophic and heterotrophic dinoflagellates (i.e., *Gyrodinium* sp.), and ciliates. Different members of the phytoplankton assemblage exhibited contrasting distribution and abundance patterns along the South Slough estuarine gradient.

Water temperature and salinity are highly seasonal water parameters, particularly in the riverine region of the South Slough. Solar radiation (photoperiod and total incident Photosynthetically

Active Radiation / PAR) and nutrient availability are of primary importance in determining daily rates of phytoplankton cell division. Phytoplankton cells that occur in the shallow tidal flat regions of the South Slough may encounter warmer temperatures and greater PAR to allow for rapid growth. Conversely, growth rates may be slower for phytoplankton in the deeper, more northern region of the estuary where they are mixed beyond typical water clarity-measured depths (1.5-2 m). Persistence of the distinct marine, estuarine, and riverine phytoplankton assemblages within different regions of the South Slough Estuary will depend on the extent of tidal circulation and mixing of the estuarine water masses over short-term and longer time scales. Seasonal cycles indicate that primary production in the estuarine water column is dominated by small phytoplankton cells, and that important trophic relationships most likely exist between the nanoflagellates, ciliates, and ultraplankton in the South Slough. Microzooplankton serve as the principal consumers of marine primary production in a complex trophic cascade that includes direct and indirect links between herbivorous copepods, protozoans, flagellates, diatoms, and small ultraplankton.

Like other estuaries and protected embayments in the Pacific Northwest, the South Slough Estuary harbors a rich diversity of zooplankton. Composition of the estuarine zooplankton assemblages varies substantially on a temporal (tidal, diel, and seasonal) basis and with the location and origin of the water mass. The permanent (holoplankton) and temporary (meroplankton) members of the zooplankton community swim weakly within the estuarine water column, and their distribution is determined largely by tidal advection into and out of the South Slough (Puls, 2001). In some cases, however, species may exhibit vertical migration patterns as a behavioral mechanism that serves to retain larvae within the estuary and resist advection into the nearshore ocean.

3.2.2 Fish

Fish species of the Coos system, listed in Table 3.2, are a critical functional component of estuarine ecosystems. Some estuarine fish species are commercially and recreationally important, while others provide food for birds, mammals, and other fish. Some species of fish can physically transfer organic materials between intertidal and subtidal estuarine habitats, and as a group, fish can be used as an indicator of estuarine condition. In some situations, fish can exert substantial top-down control over estuarine system processes.

Factors that influence the community composition and structure of estuarine fish in the riverine tidal channels of South Slough include freshwater inputs, physiological constraints, limitations on the availability of suitable habitats and prey items, and interactions between resident tidewater species and migratory fish. Seasonal changes in ambient salinity strongly influence the number of fish species that occur in the Winchester Creek region of the South Slough. Species richness of fish communities in the narrow tidal channel is typically highest during September and October when surface salinities are in the range of 15-20 psu at low tide. Rainfall events in November mark the beginning of the winter season which is characterized by increased freshwater inputs, decreased salinity, and increased current velocities. Onset of these storm events is generally correlated with a gradual decline in the species of resident fish. The anadromous salmonids, however, migrate upstream through the riverine region of the South Slough during periods of heavy rainfall and freshwater discharge in November-December (winter run) and May (spring run).

Common name	Scientific name
American shad	*Alosa sapidissima*
Black rockfish	*Sebastes melanops*
Brown Irish lord	*Hemilepidotus spinosus*
Buffalo sculpin	*Enophrys bison*
Butter sole	*Isopsetta isolepis*
Cabezon	*Scorpaenichthys marmoratus*
Chinook salmon	*Oncorhynchus tshawytscha*
coastrange sculpin	*Cottus aleuticus*
Coho salmon	*Oncorhynchus kisutch*
Copper rockfish	*Sebastes caurinus*
Cutthroat trout	*Oncorhynchus clarki*
English sole	*Parophrys vetulus*
Fluffy sculpin	*Oligocottus snyderi*
Greenling sp.	*Hexagrammos sp.*
Gunnel sp.	*Pholis spp.*
Kelp greenling	*Hexagrammos decagrammus*
Large scale sucker	*Catostomus macrocheilus*
Lingcod	*Ophiodon elongatus*
Longnose dace	*Rhinichthys cataractae*
Northern anchovy	*Engraulis mordax*
Pacific herring	*Clupea pallasii*
Pacific lamprey	*Lampetra tridentata*
Pacific sand lance	*Ammodytes hexapterus*
Pacific staghorn sculpin	*Leptocottus armatus*
Penpoint gunnel	*Apodichthys flavidus*
Prickly sculpin	*Cottus asper*
Redside shiner	*Richardsonius balteatus*
Redtail surf perch	*Amphistichus rhodoterus*
Rock greenling	*Hexagrammos lagocephalus*
Rockfish sp.	*Sebastes sp.*
Saddleback gunnel	*Pholis ornata*
Sand sole	*Psettichthys melanostictus*
Sardine, Pacific	*Sardinops sagax caerulea*
Sharpnose sculpin	*Clinocottus acuticeps*
Shiner surfperch	*Cymatogaster aggregata*
Silver spotted sculpin	*Blepsias cirrhosus*
Snake prickleback	*Lumpenus sagitta*
Speckled dace	*Rhinichthys osculus*
Speckled sanddab	*Citharichthys stigmaeus*
Starry flounder	*Platichthys stellatus*
Steelhead	*Oncorhynchus mykiss*
Striped seaperch	*Embiotoca lateralis*
Surf smelt	*Hypomesus pretiosus*
Threespine stickleback	*Gasterosteus aculeatus*
Tidepool sculpin	*Oligocottus maculosus*
Tidepool snailfish	*Liparis florae*
Topsmelt	*Atherinops affinis*
Tube-snout	*Aulorhynchus flavidus*
Walleye perch	*Hyperprosopon argenteum*
White sturgeon	*Acipenser transmontanus*
Bay pipefish	*Syngnathus leptorhynchus*

Table 3.2: List of documented fish species in the Coos system 2008-2013

3.2.3 Wildlife

Reptiles and Amphibians

Herptiles (amphibians and reptiles) are the numerically dominant vertebrate group in many riparian and aquatic habitats in the Oregon Coast Range, where they provide an essential element of riparian food webs. Out of the 16 amphibian species that inhabit Oregon's coastal forests, 12 require riparian habitats for foraging and/or reproduction. Riparian areas within the SSNERR support a moderate diversity of herptiles dominated by still-water and pond-breeding species. At least five species of reptiles and seven species of amphibians during time-constrained surveys of riparian areas located within the SSNERR.

Rough-skinned newt (*Taricha granulosa*), red-legged frog (*Rana aurora*), and Dunn's salamander (*Plethodon dunni*) are the most commonly-occurring terrestrial / splash zone species in the SSNERR. Pacific giant salamanders (*Dicamptodon tenebrosus*) and red-legged frogs are the most common amphibians in lotic habitats. Seven additional species of amphibians have been noted in riparian areas within the Oregon Coast Range physiographic province, including northwestern salamander (*Ambystoma gracile*), clouded salamander (*Aneides ferreus*), tailed frog (*Ascaphus truei*), western toad *(Bufo boreas*), foothill yellow-legged frog (*Rana boylii*), and bullfrog (*R.catesbiana*). Three additional species of reptiles may also use riparian habitats in the area including snapping turtle (*Chelydra serpentina*), western fence lizard (*Sceloporus occidentalis*), and western skink (*Eumeces skiltonianus*).

The SSNERR supports substantial populations of amphibians in open-canopy habitats, including high densities of Pacific treefrog (*Pseudacris regilla*), red-legged frog and rough-skinned newt (*T. granulosa*), all of which require lentic habitat for breeding. Amphibian species richness is lower in the open-canopied freshwater marsh areas where lungless varieties of salamanders are very rare. Conversely, the diversity of reptiles is significantly greater in the open-canopied riparian areas, most likely due to differences in habitat moisture, shade, and temperature. Members of the South Slough herptile community are distributed in an even manner in different positions of the watershed. Pacific giant salamander, red-legged frog, and rough-skinned newt are common in the lower stream reaches, while Pacific tree frog and rough-skinned newt are common in the middle and upper watershed regions. Local abundance of salamanders in the riparian woodland areas results in higher amphibian diversity in the closed-canopy forested sites.

Intermediate-sized hardwood stands, comprising closed canopy tree cover, support the greatest densities of amphibians within the forested riparian habitats of the SSNERR. Diked pasture grass areas are inhabited by few herptiles, probably because they do not provide a large range of microclimate conditions and they offer limited cover for protection from predators. In general, riparian areas within the SSNERR do not contain unique substrata, and they have limited rock fragments, negligible old growth stands, and low to moderate amounts of downed wood.

These conditions, coupled with relatively high levels of historic disturbance, contribute to a local herptile community in the SSNERR that is typical of coast range habitats. Two amphibians found in the SSNERR are becoming rare in their broader range, making the SSNERR very

important for their existence. The Oregon Department of Fish and Wildlife sensitive species list includes red-legged frogs and the southern torrent salamander (*Rhyacotriton variegatus*). Long-term protection and operation of the SSNERR as a research / natural area will ensure that critical levels of downed wood and forest stand age will increase within the riparian habitats.

Migratory Birds and Waterfowl

Open tidal channels, intertidal flats, and salt marshes of the South Slough Estuary provide important resting and forage areas for a wide variety of migratory and resident shorebirds and waterfowl. Aerial waterfowl surveys conducted during winter months by the USFWS recorded over 4,000 waterfowl in the entire Coos Estuary, and over 2,000 of the individuals occurred in the South Slough (Lance et al., 1993). In addition, over 7,000 individual shorebirds have been observed along the shoreline of the (with over 2,000 of these present in South Slough) during mid-winter surveys conducted by the Cape Arago Audubon Society (Lance et al., 1993).

A total of 58 species of birds were identified during a semi-monthly census of the open water habitats and shoreline of the South Slough Estuary (Lance et al., 1993). A substantial subset of these 58 species were observed in flight at the mouth of the estuary, in the north of SSNERR near Charleston, including 16 species of waterfowl, 5 species of gulls, 3 shorebirds, and a variety of herons, loons, terns, cormorants, and other species. Western gulls (*Larus occidentalis*), Dunlin (*Calidris alpina*), sanderlings (*C. alba*), double-crested cormorants (*Phalacrocorax auritus*), greater scaup (*Aythya marila*), buffleheads (*Bucephala albeola*), common goldeneye (*Bucephala clanga*), American wideon (*Anas americana*), and gadwall (*A. strepera*) are among the most numerous birds observed in the open water and shoreline habitats of the South Slough Estuary. The number of birds observed in the estuary is typically low in the summer and then rises sharply in November to remain high through winter until March. Peak bird numbers occur in December when combined waterfowl numbers range between 2,100 and 3,300 individuals and all other birds total 2,000 to 4,000 individuals. Birds observed entering or exiting the mouth of the South Slough Estuary followed a strong daily bimodal activity pattern with peak migrations in and out of the estuary at dawn and dusk.

Bird surveys were conducted during 2015-2016 and 2021-2023 in order to create baseline data to assess the effects of habitat restoration in the Wasson Valley catchment within the South Slough Reserve. In 2015 and 2016 two types of habitat were surveyed: forested upland habitat and lowland marsh habitat. Over the course of the surveys 40 bird species were identified either visually or through audible songs or calls. In the 2021-2023 surveys, the SSNER identified 44 bird species in these surveys. SSNERR intends to repeat these surveys after the completion of the restoration of the Wasson Valley to determine change over time.

Mammals

Several species of opportunistic, estuarine-dependent, and aquatic mammals forage, rest and sometimes reside in Pacific Northwest estuaries. These include deer mice (*Peromyscus maniculatus*), vagrant shrew (*Sorex vagrans*), raccoon (*Procyon lotor*), Columbian blacktailed deer (*Odocoileus hemionus columbianus*), American beaver (*Castor canadensis*), muskrat (*Ondatra zibethica*), nutria (*Myocastor coypus*), river otter (*Lutra canadensis*), harbor seals (*Phoca vitulina*), California sea lions (*Zalophus californianus*), northern sea lions (*Eumetopias*

jubata), and occasional juveniles of the northern elephant seal (*Mirounga angustirostris*). Rats, mice, shrews, raccoons, beavers, muskrat, and nutria are often found in direct association with salt marshes, while the river otters, seals, and sea lions are usually observed either in primary tidal channels or on the littoral flats adjacent to deep channels.

Harbor seals are frequently observed in the South Slough Estuary during their haul-outs on exposed sandflats across the channel from Collver Point. Groups of 35-60 adult and juvenile harbor seals typically rest during low tide on the sandy bank of the tidal channel, and they sometimes occur in groups of over 100 individuals. The numbers of harbor seals are usually greatest in winter and spring and coincide with the availability of forage fish. Harbor seals occur in the SSNERR, up the Winchester arm of the South Slough as far as Lattin Dike (6.5 km from the mouth of the estuary) and up the Sengstacken arm as far as Elliot Creek (5.5 km from the estuary mouth).

Raccoon and river otter are also commonly observed in the South Slough. Raccoons typically forage nocturnally and during early morning low tides in the exposed mudflats throughout the estuary where they prey upon clams, crabs, mussels, barnacles, and other invertebrates. Raccoon paw prints are nearly ubiquitous in the soft intertidal mudflats and provide evidence of their frequent low tide foraging activity. River otters are also frequently observed in riverine regions of Winchester Creek and Talbot Creek tidal channels. Likely prey items for river otters in the South Slough include shrimp (*Crangon franciscorum*), bivalves, (*Mya arenaria*), and small fish (*Leptocottus armatus, Cymatogaster aggregata*). River otters are occasionally seen in the mesohaline and marine-dominated regions of the estuary, although they are frequently sighted in the Charleston boat basin where they use floating docks as sites to rest and feed on prey items captured within the marina.

Magwire (1976) conducted a survey of small mammal populations within the salt marshes of Coos Bay. Six species of small mammals were captured in the low, mid, and high intertidal salt marshes including vagrant shrews (71% of captures) and deer mice (23% of captures), with the remainder contributed by small numbers of Oregon meadow mice (*Microtus oregonii*), western red-backed mice (*Clethrionomys occidentalis*), black rats (*Rattus rattus*), and Trowbridge shrews (*Sorex trowbridgii*). Most of these small mammals have been observed along the shoreline of the South Slough, and it is presumed that they make similar use of the salt marshes in the South Slough Estuary. Small herds of Roosevelt elk (*Cervus elaphus roosevelti*) often forage and rest in the freshwater marshes, and are sometimes observed crossing the fringing salt marshes.

American beaver feed on the bark from deciduous red alder trees that grow prolifically along the shoreline of the South Slough, and they construct rudimentary dams of fallen trees, branches, sticks, and vegetation at many locations. Beaver ponds are usually constructed in the subsidiary tidal creeks and freshwater wetlands immediately upstream from the head of tide. The beaver ponds impound significant volumes of water, flood the emergent vegetation of the low valley bottom lands, and provide lacustrine habitat for diverse communities of aquatic insects, rough-skinned newts (*Taricha granulosa*), red-legged frogs, fish (three-spine stickleback, *Gasterosteus aculeatus*; cutthroat trout, *Onchorhynchus clarki clarki*; coho salmon, *O. kisutch*; Pacific lamprey, *Lampetra tridentatus*), and several species of waterfowl.

Common upland large game species that inhabit the SSNERR include black-tailed deer, Roosevelt elk and the North American black bear (*Ursus americanus*). These species are influenced by levels of forage quality / quantity and, to some extent, by thermal refugia and security cover. High levels of forage shrub species currently occur within the SSNERR, along with significant forested areas and relatively low levels of disturbance.

Several marine mammals species are temporary Coos Estuary residents to feed and rest. Harbor seals prey upon resident estuarine fish and haul out in large numbers on the exposed tideflats in the lower region of the Coos Estuary and in South Slough. California sea lions are common near docks and marinas and Steller sea lions (*Eumetopias jubatu*s) frequently forage in the estuary from their haul out sites at nearby Cape Arago. Juvenile northern elephant seals, orca (*Orcinus orca*), harbor porpoise (*Phocoena phocoena*), and gray whales (*Eschrichtius robustus*) are occasional visitors to the Coos Estuary.

3.2.4 Protected Species

Endangered Species and Critical Habitat:

The Endangered Species Act (ESA) requires the designation of "critical habitat" for listed species when "prudent and determinable." Critical habitat includes geographic areas that contain the physical or biological features that are essential to the conservation of the species and that may need special management or protection. Critical habitat designations affect only Federal agency actions or federally funded or permitted activities. Federal agencies are required to avoid "destruction" or "adverse modification" of designated critical habitat. Critical habitat may include areas that are not occupied by the species at the time of listing but are essential to its conservation. The ESA listed species located within the existing SSNERR and boundary expansion area are listed below in Table 3.3. None of the listed species has designated critical habitat within the SSNERR area or the expansion area.

SSNERR is the native habitat for many protected bird, aquatic and terrestrial mammal, fish, reptile, plant, and invertebrate species, among others. Species within the SSNERR are generally healthy, though habitats are exposed to increasing stressors from changing land use, increased pollutant loads, declining freshwater inflows, and changing climate.

The Reserve actively monitors populations of the endangered Western Lily in the proposed boundary expansion area and Point Reyes Birds Beak along South Slough shorelines and is beginning to monitor habitat conditions for and presence/absence of Marbled Murrelet. Regular fish monitoring has documented one occurrence of green sturgeon and relatively low numbers of Coho salmon and eulachon.

Some of these species are designated by the USFWS as either threatened or endangered. Threatened or endangered species that occur in the SSNERR area or that might be affected by the boundary expansion are listed in Table 3.3. Descriptions of the listed species are included after the table.

Common Name	Scientific Name	Listing Status under ESA	Critical Habitat?
Mammals			
Pacific Marten, Coastal Distinct Population Segment	*Martes caurina*	Threatened	No
Birds			
Marbled Murrelet	*Brachyramphus marmoratus*	Threatened	No
Northern Spotted Owl	*Strix occidentalis caurina*	Threatened	No
Western Snowy Plover	*Charadrius nivosus nivosus*	Threatened	No
Flowering Plants			
Western Lily	*Lilium occidentale*	Endangered	No

Table 3.3. Listed Species of flora and fauna located within the existing SSNERR and boundary expansion area (IPaC Report).

Mammals:

Pacific Marten, Coastal Distinct Population Segment (*Martes caurina*); ESA Threatened

The marten is a medium-sized carnivore related to weasels (*Mustela* sp.), minks (*Neovison* sp.), otters (*Lontra* sp.), and fishers (*Pekania* sp.). Martens have brown fur with distinctive coloration on the throat and upper chest that varies from orange to yellow to cream. They have proportionally large and distinctly triangular ears and a bushy long tail. Martens are territorial, and dominant males maintain home ranges that encompass one or more female's home ranges. Martens have a generalist diet dominated by small mammals, but birds, insects, and fruits are also seasonally important. Martens across North America generally select older forest stands that are structurally complex (*e.g.,* late-successional, old-growth, large-conifer, mature, late-seral). These forests generally have a mixture of old and large trees, multiple canopy layers, snags and other decay elements, dense understory, and have a biologically complex structure and composition. A thorough review and assessment of the taxonomy, life history, and ecology, including limiting factors and species resource needs of the coastal marten is presented in the Species Status Assessment report.

Birds/Migratory Birds:

Marbled Murrelet (*Brachyramphus marmoratus*); ESA Threatened

The marbled murrelet is a small, chubby seabird that has a very short neck. During the breeding season it has dark brown to blackish upperparts and a white belly and throat that are greatly mottled. During the winter the upperparts become grey, dark marks form on the sides of the breast and a white ring develops around the eye. Males and females are similar in appearance and size. Juveniles are similar to the adult winter plumage, but with dusky mottling on the underparts. Vocalizations include a sharp keer' or low kee'.

The species historical range included Alaska, California, Oregon, Washington.

Northern Spotted Owl (*Strix occidentalis caurina*); ESA Threatened

The northern spotted owl is a medium-sized, dark brown owl with a barred tail, white spots on the head and breast, and dark brown eyes surrounded by prominent facial disks. Males and females have similar plumage, but females typically weigh 10 to 20% more than males. The species historical range included California, Oregon, Washington.

Western Snowy Plover (*Charadrius nivosus nivosus*); ESA Threatened

The snowy plover is a small shorebird with moderately long legs and a short neck. The back is pale tan while bottom surfaces are white, and have dark patches on the sides of their neck which reach around onto the top of their chest. Juveniles are similar to nonbreeding adults, but have scaly pale edging on their back feathers.

MBTA Birds of Concern:

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures as outlined by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. The birds listed below are birds of concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention during project activities in the South Slough area. The below list is not guaranteed to include every bird that may be found in the area.

USFWS Birds of Conservation Concern for South Slough Area		
• Bald eagle • Black oystercatcher • Black swift • Black turnstone • California gull	• Cassin's auklet • Clark's grebe • Evening grosbeak • Marbled godwit • Olive-sided flycatcher	• Rufous hummingbird • Short-billed dowitcher • Tufted puffin • Western grebe • Wrentit

Table 3.4: USFWS Birds of Conservation Concern for South Slough Area

3.3 Cultural and Historic Resources

History

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. The Miluk villages were nearly autonomous gatherings of around 100 people. The Miluk people hunted, fished, and gathered all the food and fiber needed for subsistence. Wooden fish weirs, antler hooks, and nets were used to catch a variety of fish; elk and deer were trapped in large pits. 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 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 1850s, the Miluk speaking people lived in the southern part of the Coos Estuary, including in areas of the SSNERR. 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. Descendants of the Coos peoples and other neighboring tribes now comprise the Confederated Tribes of the Coos, Lower Umpqua and Siuslaw Indians. Descendants of 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 forcefully removed from the region. Eventually, in the 1870s, land was surveyed and divided up into allotments which were granted to "eligible Indians" (Tribal Members or the head of household for an eligible Tribal family). Eligible individuals could select an authorized parcel or one could be assigned to them. Although allotments provided Tribal peoples with land after their forceful removal, the Euro-American concept of parcel designation also perpetuated Tribal assimilation into Euro-American culture. Under the allotment program, Tribal families 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.

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 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 schoolhouse, 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. The last building of this period still standing in the South Slough watershed is the Fredrickson shed. Aside from an abandoned non-historic residential home site in the Deal parcel, there are no other buildings in the expansion area. If the Reserve acquires that property, efforts would be made to remove the house and any associated infrastructure, then restore the area to natural ecological conditions. Should this residence be acquired, NOAA would examine the issue of the residence and would comply with NEPA, NHPA, and other applicable laws ahead of any alteration or demolition. Though the area holds current and historical importance to Tribal communities, there are no particular Tribal sites known at this time in the expansion areas.

3.3.1 Tribal Resource Protection

Reserve staff works closely with both the Confederated Tribes of the Coos, Lower Umpqua, and Siuslaw Indians; the Coquille Indian Tribe; and the Confederated Tribes of Siletz Indians, as well as with the Oregon State Historic Preservation Office, to plan, document, and protect cultural resources in the SSNERR. The SSNERR also works with federal partners to support cultural resource protection via compliance with Section 106 of the National Historic Preservation Act (NHPA). Projects in the SSNERR incorporate archeological consultations and cultural planning before implementation. Some projects in the SSNERR are entirely for the purpose of cultural restoration, such as the refurbishment of the Fredrickson shed (MP p. 2-15).

3.4 Socioeconomic Resources

In reference to NERRs, socioeconomic resources mean the economic and social resources that may be impacted by reserve actions. Economic resources are, essentially, anything that goes into producing a good or service. More specifically, economic resources can be agriculture, shipping, fisheries, tourism, or recreation, among many other potential businesses or industries.

The South Slough does not support a large commercial industry, though commercial activity exists on the South Slough where it joins Coos Bay. Commercial fishing supports a number of seafood processing plants in Charleston. Additionally, the Oregon Department of Agriculture leases several thousand acres of state-owned submerged lands in the Coos and South Slough estuary for commercial oyster cultivation. The presence of the commercial oyster industry and recreational clam harvest in the estuary encourages maintenance of excellent water quality.

To support an industrial center and shipping port, the navigational channel of the Coos Estuary is routinely dredged to maintain adequate depths for commercial shipping. Other area industries include commercial fishing, seafood processing, wood product industries, healthcare, and tourism. Commercial fishing supports a number of seafood processing plants in Charleston. Timber extraction has also been a primary industry in the Coos areas since Euro-American settlement. Within the South Slough watershed, approximately 70% of land is in private or county ownership, with most of these lands actively managed for timber production. Approximately 5 % of the South Slough watershed is zoned for rural residential occupation.

The economic base of the Coos area is in a state of transition. For more than one hundred years after Euro-Americans arrived, the ocean and once dense forests of the Coos watershed supported large-scale commercial fishing, logging, and shipping operations. However, as these resources declined, so did their related businesses, resulting in an uncertain economic future for the region. Many of the younger generations move outside of the area to find gainful employment. At the same time, recreation and tourism are growth industries in the 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 component of the area economy.

The unemployment rate of Coos County is approximately 5.2%, which is 0.8% higher than the rest of the state, and 1.7% higher than the U.S.. As of December of 2022, Coos County is down more than 700 jobs since October of 2019 in areas like private education, local government, mining, and logging, though there were employment gains in the accommodations and food and beverage industry. The poverty level in Coos County is trending lower since 2020, with the median household income surpassing $50,000 for the first time since 2020 (Meadows, 2022). The SSNERR generates approximately $6.1 million annually, including $2.3 million in labor income, and provides 65 jobs, according to a recent economic survey completed by NOAA OCM and Eastern Research Group, supported by Pew Charitable Trusts. The Reserve pays staff and spends money locally by purchasing equipment, on boat and auto maintenance, and in other categories related to its operations. SSNERR spending supports over 56 jobs and contributes to $5.3 million in revenue to the region. Visitors come to South Slough to go hiking, view wildlife, kayak, and enjoy other recreational activities. They spend money locally on food, transportation, and recreational equipment. This generates around $850,000 in revenue and supports an additional 10 jobs in the area.

3.4.1 Land Use

The South Slough watershed is a mixed-use drainage basin that contains parcels zoned for municipal development, shoreline industry, private residential uses, farmland, private commercial and public timber production, and for conservation. As a mixed-use basin, the South Slough watershed provides a representative example of a Pacific Northwest coastal ecosystem that integrates functional processes within upland forests and commercial timberlands, coastal streams and riparian areas, estuarine tidelands, nearshore marine regions, and varied municipal, rural, and industrial areas.

Municipal development and shoreline industrial activities are concentrated at the mouth of the South Slough Estuary, immediately north and south of the Charleston Bridge. Historic salt

marshes located at the mouth of the estuary (near its confluence with the Coos Estuary) have been filled with sandy dredged materials to provide flatlands for the township of Charleston, U.S. Coast Guard facilities, an academic marine institute, docks and marinas, port and harbor landing areas, recreational parking lots, seafood processing plants, shipyards, and other shoreline developments. Only a few acres of fringing marsh remain in the northern region of the South Slough Estuary. Submerged and submersible lands that make up the 783 hectare estuarine tidal basin are owned largely by the DSL, although a few parcels of tidelands are under private ownership.

Private residential parcels are limited primarily to the northern region of the South Slough watershed, and they extend to the shoreline along the north-western region near Metcalf Marsh and Collver Point, within Joe Ney Slough, and along the shoreline of Crown Point. Joe Ney Slough is a subsidiary tidal inlet that merges with South Slough near the Charleston Bridge. The lower region of Joe Ney Slough is used for commercial oyster mariculture, and the upper waters are dammed for municipal water storage. Light residential use extends into the northeast region of the watershed. A municipal landfill is located in the eastern region of the watershed at the headwaters of Day Creek. The landfill is operated primarily as a disposal facility for construction debris. The steep west ridge of the South Slough watershed provides the primary roadway for vehicular travel (Seven Devils Road) and access routes for residential development. These are primarily private homes and small woodlots with occasional grazing pastures for horses.

The southern region of the South Slough watershed is primarily owned and managed by Coos County and private companies for timber production. Like many other coastal watershed landscapes located along the southern Oregon coast, the upland forest communities within the South Slough watershed are strongly influenced by commercial plantings of Douglas-fir. Portions of the South Slough watershed are also used for recreational fishing, hunting, hiking, horseback riding, motorcycling, bicycling, and other recreational pursuits.

Recreational Resources and Tourism

The South Slough offers various recreational activities that attract approximately 9,947 visitors throughout the year. Hiking paths and boardwalks wind through forests and wetlands throughout the SSNERR, offering visitors views of salt marshes, mudflats, woodlands, and an assortment of native plants and animals. Visitors often bring kayaks and canoes to navigate the waterways of the South Slough. At the Visitor Center, visitors can learn about local habitat and wildlife, the history of SSNERR, and some of the active research taking place. Interpretive programs and other community classes offer unique opportunities to engage with the surrounding area. Visitors can sign up in advance to participate in a rotating list of classes offered, including guided hikes, kayak paddle trips, birding excursions, and building bat houses. K-12 science camps and programs are also available for children and teens, primarily in the summer. The SSNERR also allows fishing and hunting in designated areas and in accordance with state regulations and fee-based permits issued by Oregon Department of Fish and Wildlife. Recreational mushroom and berry picking are also popular activities that bring visitors to the reserve.

3.4.2 Population

Coos County, Oregon's estimated population was 65,307 in 2020, with a growth rate of 0.29 % in the past year according to the most recent United States census data. Coos Bay had a 2020 population of 15,989.

Environmental Justice

As described above, South Slough's population is very small and the percentage of that population that is minority or low-income is even smaller. Approximately 90% of the population is white, 0.7 % is black or African American, 3% is American Indian and Alaska Native, 1.3% is Asian, 7.2% is hispanic or latino, and 0.3% is Native Hawaiian and Other Pacific Islander. 90% of households have a computer, and 84.7% of households have a broadband internet connection. 90% of the population has a high school diploma, and 20% have a bachelor's degree or higher. 16.6% of the population has a disability. Approximately twenty seven percent of Coos County population use food stamps, and 17.4% of the population are living in poverty (U.S. Census Bureau Coos County 2021). Coos County, OR public schools have an average math proficiency score of 32% (versus the Oregon public school average of 40%), and reading proficiency score of 49% (versus the 54% statewide average). Schools in Coos County have an average ranking of 3/10, which is in the bottom 50% of Oregon public schools (Public School Review 2023).

Chapter 4 Environmental Consequences

This chapter examines the anticipated environmental consequences for the presented alternatives (including the slightly modified boundary alternative 2B) addressed in this Environmental Assessment. The environmental consequences are applicable to the affected environment described in Chapter 3.

The determination of whether an effect (impact) of a proposed action is "significant" is based on criteria established in Council on Environmental Quality (CEQ) Guidance and NOAA standards and practice, including the "Policy and Procedures for Compliance with the National Environmental Policy Act and Related Authorities: Companion Manual for NOAA Administrative Order 216-6A" (NOAA, January 31, 2017). The term "effects" (which is synonymous with "impacts" in the Council on CEQ regulations [40 CFR 1501.3, 1508.1 (2022)]) includes ecological, aesthetic, historic, cultural, economic, social, and health. Effects also include direct effects, which are caused by the action and occur at the same time and place; indirect effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable; and cumulative effects, which are the incremental effects of the action when added to the effects of other past, present, and reasonably foreseeable actions; and, both beneficial and adverse effects, even if on balance the agency believes that the effect would be beneficial. An agency action may also have no impact on a particular resource or human use.

Alternative 1: No Action

The No Action Alternative provides a baseline against which environmental consequences of the SSNERR expansion alternative are compared. Under the No Action Alternative, the SSNERR management boundary would remain the same as the current boundary managed under the SSNERR MP, 2017-2022. The additional parcels the state purchased would not be incorporated into the NERR, but the State would likely continue to own and manage the land consistent with

the management of the NERR, but without the additional funding opportunities NERRs are eligible for. As described in Chapter 1, Section 315 of CZMA authorizes NOAA to designate different estuarine areas as estuarine reserves for inclusion in the NERRS for the purpose of long-term research, estuarine education, and environmental stewardship programs. The System also provides a framework through which management approaches, research results, and techniques for estuarine education and interpretation can be shared with other programs. Under the No Action Alternative, the expansion parcels would not be formally managed under the SSNERR MP.

All NERRs in the System receive federal support through OCM. OCM plays four primary roles in the NERRS operations. First, it disburses and oversees expenditures of federal funds for research, education, land acquisition, operations, and development of individual reserves. Second, OCM coordinates and provides guidance in the development of policy for the NERR system. Third, OCM promotes the System and undertakes certain projects that benefit the entire System. Finally, OCM participates in the periodic evaluation of Reserve operations to ensure compliance with federal requirements and with the individual Reserve's federally-approved MP. Under the No Action Alternative, NOAA OCM would not provide funding for SSNERR operations in the expansion areas, which possess similar biogeographical and ecological characteristics as of the current SSNERR, under the SSNERR MP. Federal funds through OCM / state cooperative agreement would not be used in the scientific research, environmental monitoring, environmental education and outreach, habitat restoration, and other natural resource management efforts of the expansion areas.

Alternative 2: Proposed Action (Boundary Expansion of 1,771 Acres)

Under the proposed action, NOAA would approve the incorporation of the additional expansion area (1,771 acres) into the existing management boundary of the SSNERR (15 C.F.R. § 921.33). The expansion parcels were acquired by DSL between 2008 and 2022 for the purposes of inclusion in the NERR. The boundary change would formally extend the comprehensive conservation and management capacities identified in the NOAA-approved SSNERR MP to these new areas, providing a mechanism for implementation of specific restoration, monitoring and research activities for important marine resources. As described in Chapter 1, Section 315 of CZMA authorizes NOAA to designate different estuarine areas as estuarine reserves for inclusion in the NERRS for the purpose of long-term research, estuarine education, and environmental stewardship programs. The System also provides a framework through which management approaches, research results, and techniques for estuarine education and interpretation can be shared with other programs. Under the Action Alternative, the inclusion of the additional properties would extend the reach of the SSNERR MP by 1,771 acres and result in a final boundary area of 6,542 acres.

Under the Proposed Action Alternative, NOAA OCM would extend its comprehensive natural resource protection to the South Slough expansion areas, which possess similar biogeographical and ecological characteristics as of the existing SSNERR. Federal funds through OCM / state cooperative agreement would be used in the scientific research, environmental monitoring, environmental education and outreach, habitat restoration, and other natural resource management efforts of the expansion areas.

The selected parcels would serve numerous benefits to the SSNERR. For example, the Entrance and Block parcels would add land to the entrance of the SSNERR, which would expand the primary public access to trails within the SSNERR. Other parcels, such as the Hidden Creek and North Creek Headwater parcels would increase the SSNERR's opportunity to restore ecological integrity and conduct education and interpretive programs. All parcels are adjacent to the established Reserve, and addition of the lands would extend the reach of the environmental stewardship already enjoyed by lands within the current boundary. Additionally, because the DSL previously acquired these lands for coastal conservation purposes, the addition of the lands within the SSNERR boundary would not alter the intention of environmental stewardship associated with the management of these lands, but would formally incorporate the areas into the NERRs boundary and require management consistent with the NERRs regulations as a matter of federal law.

Alternative 2B: Addition of Deal and Winchester Parcels (Additional 105 acres)

SSNERR is also in the process of exploring the acquisition of additional properties with funding opportunities made available through the Bipartisan Infrastructure Law (BIL). One confirmed and active acquisition project is the Winchester Parcel, comprising approximately 76 acres of upland forest habitat adjacent to the southeast corner of the SSNERR. This property is owned by the State of Oregon and managed by DSL as an asset to the Common School Fund. There is strong support within DSL for SSNERR to purchase the property and bring it into the SSNERR boundary. The second parcel of interest is the Deal Property, which is owned by Coos County and comprises approximately 29 acres of lowland pasture (former wetland), plus a surrounding forested buffer.

Entry Property Expansion Area comprises less than a quarter of an acre of mature forest adjacent to the Entrance Property. This property is owned by a private landowner. The SSNERR currently anticipates acquiring this property by exchanging with the private landowner a similar sized portion of grassland in the current Entrance Property that is managed as a buffer. The private landowner plans to construct a private access road on the edge of this grassland parcel. This use is not anticipated to adversely affect the buffer value of the remaining Entrance Property or the newly acquired woodland property. The addition of the woodland property will have a net ecological gain for the SSNERR because it provides a greater diversity of mature tree and understory habitat and fills a wedge-shaped ownership gap along the Reserve's driveway to its visitor center (Figure 2.3). The woodland property allows for a small but important increase in habitat and species diversity, water and air filtration, flood risk reduction, carbon capture, and erosion reduction. Because the exchange is for equal sized parcels, there is no net gain or loss of acreage to the SSNERR.

After a preliminary analysis of the potential effects of Boundary Alternative 2B on each resource area outlined in this chapter, NOAA determined that the additional 105 acres is anticipated to have the same or substantially similar effects as the additional 1,171 acres. This is because the area consists of 8% of the acreage of the boundary alternative, will be managed as buffer, and will be available for recreation, research, and monitoring in the same manner as the other added parcels. The manner in which resources are affected or the magnitude of those effects, is the same or substantially similar, as is the nature of effects on those resources, both beneficial or adverse. The additional acreage will have the potential to add additional benefits of a similar

nature, but generally of a slightly minor increase in scale of any benefits or adverse effects. As such, the effects of Alternative 2 and Alternative 2B are discussed together as the Boundary Alternatives throughout this chapter, with any unique effects noted where appropriate.

4.1 Physical Environment

4.1.1 Alternative 1 (No Action)

4.1.1.1 Air Quality

Under the No Action Alternative, the integrated resource management framework of NERRS would not be extended in the expansion parcels. This alternative is not expected to have a significant impact on the air quality of the South Slough region because no net change in overall traffic is anticipated, regardless of the alternative that is ultimately implemented. However, monitoring and research programs under the SSNERR MP would be limited to the land within the current boundary. Additionally, under this approach the additional parcels would not enjoy the benefits of environmental stewardship programs in place under the MP that promote the environmental health of the current boundary.

4.1.1.2 Greenhouse Gas Emissions and Effects of Climate Change

As noted above, the Oregon coast is vulnerable to many climate related changes, particularly sea level rise and changes in ocean acidity (pH). In the Coos Estuary, the fate of built environments (e.g. roads and hardened shorelines) and ecosystems (e.g. tidal wetlands and eelgrass beds) is unknown as sea levels change. An increase in sea level may influence habitat and species distributions as well as infrastructure, which concerns commercial economies, coastal accessibility, and human safety. Decreasing ocean pH (acidification) is also a local concern, as it has serious implications for water quality, shellfish industries, and ecosystem services. Ocean acidification has already had noticeable effects in the Pacific Northwest, including impairment of shellfish production in Netarts Bay and Willapa Bay.

Under the No Action Alternative, there would be no change to the SSNERR boundary. The No Action Alternative is not expected to have an impact on the greenhouse gas emissions that cause climate change in the South Slough region, and it would not change the way emission monitoring and climate change research is currently conducted.

4.1.1.3 Water Resources and Quality

The SSNERR has fully implemented the NERR system-wide monitoring plan (SWMP) for measuring water quality, nutrients, and meteorological data. The principal mission of this monitoring program is to develop quantitative measurements of short-term variability and long-term changes in the integrity and biodiversity of estuarine ecosystems for the purposes of contributing to effective coastal zone management. Reserve staff members work with local Tribes, communities, and regional groups to monitor water quality and address coastal resource management issues.

Under the No Action Alternative, the expansion parcels would not be included in the SSNERR boundary and the integrated resource management efforts of the SSNERR would not be extended in the expansion parcels or otherwise altered. This alternative would not benefit from the SSNERR's additional resources and regulatory requirements protect water quality by limiting commercial activities like logging in the expanded parcels and expand monitoring and restoration through additional resources, coordination, and support through NOAA funding, which would benefit physical resources in both the SSNERR and the surrounding areas.

4.1.1.4 Geology and Substrates

The No Action Alternative is not expected to have a significant impact on the status of the geological features and soils of the SSNERR and adjacent region because there would be no expansion of the SSNERR that would allow research, monitoring, and habitat restoration in a larger area.

4.1.1.5 Habitats

Adoption of the No Action Alternative would mean that opportunities to restore habitats or prevent habitat degradation on the expansion parcels would be lost. Habitat degradation around the current SSNERR already adversely affects habitat quality within the current SSNERR boundary long-term, such as by contributing runoff or pollution that enters the SSNERR. Excluding the expansion parcels from habitat management research could limit the integrated assessment of habitats located around the current SSNERR boundary, which may leave habitats located in the current boundary vulnerable to anthropogenic degradation. Exclusion of the expansion parcels would also prevent that area from enjoying robust pollution protection and mitigation efforts, such as habitat restoration projects and long-term water quality monitoring conducted by the SSNERR. Additional environmental stewardship projects are described in Section 2.2. Excluding the expansion parcels from habitat management research could limit the integrated assessment of habitats located around the current SSNERR boundary, which may leave habitats located in the current boundary vulnerable to anthropogenic degradation. However, no long-term adverse impacts are anticipated, as the adverse impacts that are currently experienced by the SSNERR from adjacent land uses would simply continue.

4.1.2 Boundary Expansion Alternatives

The preferred Boundary Expansion Alternatives would provide additional opportunities for research, monitoring, and education for the SSNERR. Ownership of the parcels would remain unchanged. This expansion would allow for increased coordination and would provide a mechanism for integrated ecosystem management, which would help the SSNERR achieve its goals of conserving natural biodiversity and protecting cultural resources.

The acquisition would allow for increased and improved research and monitoring efforts, which would aid in the environmental protection of the SSNERR, leading to indirect, beneficial effects. This action would also provide additional educational and outreach opportunities for the general public, thus providing a more positive experience to visitors of SSNERR.

4.1.2.1 Air Quality

No destructive activities are included in this action, no impact to air quality is anticipated. Inclusion of the additional parcels would allow the area to benefit from formal resource management under the SSNERR MP. Any specific future management activities would be performed in compliance with all applicable environmental laws.

The expansion of the NERR boundary would have minor indirect beneficial effects associated with expansion to include more protected land managed under the SSNERR MP. An expanded NERR may result in a slightly greater level of attendance from the general public, leading to a de minimis increase in vehicle emissions. No overall impact on air quality due to vehicle exhaust is anticipated.

Boundary Alternative 2B is expected to have the same or substantially similar effects due to the small acreage of these additional parcels.

4.1.2.2 Greenhouse Gas Emissions and Effects of Climate Change

As discussed above, climate change is causing serious impacts to the South Slough region. The inclusion of the additional parcels is not expected to measurably increase greenhouse gas emissions or worsen climate change impacts, but instead would encourage environmental protection efforts throughout the South Slough region as a whole. Formal protection of the expansion parcels would allow for the continuation of emission monitoring and climate change research programs within the SSNERR. Therefore, this alternative would permit analysis of greenhouse gas emission and climate change data in the region as a whole, and would expand the SSNERR's ability to educate on the topics. Additionally, inclusion of the expansion parcels would allow for mitigation of climate change effects by extending the SSNERR's ability to preserve the area through effective stewardship of the land. Therefore, the Boundary Expansion Alternatives would likely have minor, positive effects on greenhouse gas emissions and effects of climate change long-term.

Boundary Alternative 2B is expected to have the same or substantially similar effects due to the small acreage of these additional parcels.

4.1.2.3 Water Resources and Quality

The inclusion of the additional parcels has no potential to cause a significant impact on any water resource. Under the Boundary Expansion Alternatives, overall water quality of the SSNERR region would not be negatively affected. In fact, the inclusion of the additional property within the SSNERR boundary would likely allow for minor water quality improvements in the South Slough region because environmental protection efforts would be expanded to the additional parcels. The current boundary enjoys pollution prevention and mitigation efforts, water quality research and monitoring, and outreach and education programs to promote cleaner water quality in the SSNERR area. The expansion of these measures would allow the expansion parcels to also benefit from such water resource protections, which would in turn promote healthier water in the entire South Slough region.

Boundary Alternative 2B is expected to have the same or substantially similar effects due to the small acreage of these additional parcels. The Deal property contains a former wetland which the SSNERR would restore to a functioning wetland habitat. Incorporating this parcel in the SSNERR boundary would extend the SSNERR's efforts to maintain wetland habitats and thus improve water quality in the area.

4.1.2.4 Geology and Substrates

The Boundary Expansion Alternatives are not expected to have a significant immediate impact on geological features and soils of the South Slough reserve and adjacent region. However, this action can ensure that programs under the MP are conducted in the expansion areas, which could prevent disruption to those geologic features long-term, leading to minor, indirect, beneficial impacts. The current boundary enjoys protection from activities that could modify the geological features and soils of the SSNERR. Expansion of the SSNERR boundary would thus extend these protections to the expanded area.

Boundary Alternative 2B is expected to have the same or substantially similar effects due to the small acreage of these additional parcels.

4.1.2.5 Habitats

Expanding the SSNERR boundary would extend the SSNERR's efforts to maintain natural habitats. The SSNERR employs various measures to promote the integrity of habitats found within the SSNERR. For example, invasive species management is crucial in protecting the habitat of native species. Expanding the boundary of SSNERR decreases the likelihood of invasive species growth because the expansion would allow for the implementation of species management measures throughout the SSNERR as an integrated unit. Additionally, the Boundary Expansion Alternatives would allow the SSNERR to include the expanded parcels to perform research, monitoring, and habitat restoration under the MP. The inclusion of additional properties in SSNERR research efforts would allow for a better understanding of management measures that would best benefit the SSNERR.

Thus, the Boundary Expansion Alternatives have no potential to directly impact SSNERR habitats, but could potentially benefit these habitats indirectly in the long-term through increased environmental protection efforts. NOAA's OCM would ensure NEPA and environmental compliance requirements are fulfilled for any specific future projects as future funding decisions are made.

Boundary Alternative 2B is expected to have the same or substantially similar effects due to the small acreage of these additional parcels. The Winchester property comprises old growth forestland, which contains habitat for the ESA-listed species Marbled Murrelet. Addition of this property could allow for additional opportunities for endangered species protection.

4.2 Biological Environment

4.2.1 Alternative 1 (No Action)

4.2.1.1 Invertebrates

Implementation of the No Action Alternative is not likely to cause a significant effect on invertebrate species in the SSNERR region. However, in the long-term, excluding the expansion parcels from the SSNERR MP may cause minor adverse effects on these species. As noted in Section 3, SSNERR research and monitoring efforts focusing on terrestrial invertebrates in the SSNERR are plentiful. Including the expansion parcels in the MP would allow for more complete monitoring of invertebrate species within the South Slough region. Following the No Action Alternative could limit integrated monitoring and research efforts of the SSNERR. Over time, this may skew invertebrate data and prevent informed decisions regarding protection efforts for the species.

4.2.1.2 Fish

Implementation of the No Action Alternative is not likely to cause a significant effect on fish species in the SSNERR region. However, in the long-term, excluding the expansion parcels from the SSNERR MP may cause minor adverse impacts to fish species. There are numerous fish species found within the South Slough. The No Action Alternative would exclude the expansion parcels from environmental stewardship actions executed by the SSNERR. Additionally, expanding the boundary would allow for more complete monitoring of activities that might affect fish species within the South Slough region. Declining to include the additional parcels in the NERR would prevent SSNERR from expanding the environmental monitoring and conservation efforts that the current boundary enjoys. This may result in insignificant adverse impacts to fish species and EFH in the long-term.

4.2.1.3 Wildlife

As evidenced in Chapter 3, South Slough is home to many wildlife species. While wildlife species have their preferred habitats, they are mobile, and may be found in a variety of environments. The No Action Alternative would limit the SSNERR's wildlife protection measures to the current boundary, leaving the expansion parcels vulnerable to environmental harm that impacts wildlife species found throughout the South Slough region. Exclusion of the proposed parcels would also prevent the SSNERR from being managed as a larger unit, which may cause insignificant harm to species in the long-term. For example, data collection and analysis are critical for understanding changes occurring in the environment that affect wildlife species found throughout this region. Excluding the expansion parcels from the SSNERR's wildlife research may obstruct the assessment of wildlife located in the South Slough region.

4.2.1.4 Protected Species

SSNERR is the native habitat for many bird, marine and land mammal, fish, reptile, plant, and invertebrate species, among others. It is essential to understand how populations of rare and endangered species change over time in response to Reserve land management practices.

Threatened or endangered species that are known to occur in the SSNERR area or boundary expansion area are listed in Table 3.3 (supra). When unmanaged, invasive species out-compete native species for resources, reducing native species diversity and resiliency. This can particularly affect endangered and threatened species. Additional information regarding species within the boundary can be found in Chapter 3. Following the No Action Alternative would prevent efforts to maintain natural habitats and manage invasive species in the new parcels, which would result in the minor likelihood of an increase of invasive species spread to the current SSNERR area.

4.2.2 Boundary Expansion Alternatives

4.2.2.1 Invertebrates

Implementation of the Boundary Expansion Alternatives is not expected to cause a significant effect on invertebrate species in the SSNERR region. Inclusion of the expansion parcels in the SSNERR MP would extend the monitoring and research efforts of the SSNERR and would allow for incorporation of invertebrate data for SSNERR as an integrated unit. Following the Boundary Expansion Alternatives would allow for extended monitoring and research efforts of the SSNERR, which would yield more accurate invertebrate data for SSNERR. Oyster harvesting and mariculture is expected to be allowed to continue in the expanded areas, so there will be no change to this use's impacts on invertebrates. In sum, any impact on invertebrates is likely to have minor, long-term positive effects on the species.

Boundary Alternative 2B is expected to have the same or substantially similar effects due to the small acreage of these additional parcels.

4.2.2.2 Fish

The Boundary Expansion Alternatives are not expected to cause a significant effect on fish species in the SSNERR region. There are numerous fish species, and EFH for multiple species, present within the South Slough. Incorporating the expansion parcels in the SSNERR boundary would extend environmental stewardship measures to those parcels, which would promote environmental protection throughout South Slough. These actions would promote the environmental integrity of the region and thus prevent fish species and EFH from harm. Additionally, expanding the boundary would allow for more complete monitoring of activities that might affect fish species within the South Slough region. Including these parcels in the environmental monitoring and conservation efforts that the current boundary enjoys may benefit fish species and EFH in the long-term.

Boundary Alternative 2B is expected to have the same or substantially similar effects due to the small acreage of these additional parcels.

4.2.2.3 Wildlife

The Boundary Expansion Alternatives are not anticipated to cause a significant effect to wildlife in the South Slough region. SSNERR and the proposed expansion area encompasses habitats for a wide assortment of wildlife species, including bird, marine and land mammal, fish, reptile,

plant, and invertebrate species, among others. While these species have their preferred habitats, they are mobile, and may be found in a variety of environments. Including the expansion parcels in the SSNERR boundary would allow for more complete monitoring and conservation of wildlife species within the South Slough region. Additionally, habitat restoration and pollution prevention and mitigation measures that would extend to the expansion parcels would allow for further protection for wildlife species in the South Slough region as a whole. These factors are expected to result in minor, beneficial, long term impacts to these species.

Boundary Alternative 2B is expected to have the same or substantially similar effects due to the small acreage of these additional parcels.

4.2.2.4 Protected Species

The Boundary Expansion Alternatives are not anticipated to cause a significant effect to protected species in the South Slough region. Some species found within the SSNERR region are designated by the USFWS and NMFS as either threatened or endangered. Threatened or endangered species that are known to occur in the SSNERR area or the boundary expansion area are listed in Table 3.3 (supra). As noted above, there are non-native invasive species present throughout the SSNERR region that threaten protected species. When unmanaged, the invasive species out-compete native species for resources, reducing native species diversity and resiliency. With the expansion of the SSNERR to include the expansion parcels in the MP, the SSNERR's efforts to maintain natural habitats and manage invasive species would be extended to the new parcels. These factors are expected to result in minor, beneficial, long term impacts to these species.

Boundary Alternative 2B is expected to have the same or substantially similar effects due to the small acreage of these additional parcels. The addition of the Winchester property comprises old growth forestland, which contains habitat for the ESA-listed species Marbled Murrelet. Addition of this property could allow for additional opportunities for formal endangered species protection programming under the SSNERR MP.

4.3 Cultural and Historical Resources

4.3.1 Alternative 1 (No Action)

The SSNERR currently works closely with local Tribes and local stakeholders to protect cultural and historical resources. The No Action Alternative would not limit SSNERR's current coordination with tribes or the state's ongoing duties to protect cultural and historic resources under State laws on State owned lands, Maintaining the status quo, however, may limit the SSNERR's access to funding opportunities that may enhance cultural resource protection through support from NOAA.

4.3.2 Boundary Expansion Alternatives

Expanding the SSNERR management area will provide the means to identify and protect historically and culturally significant sites and structures should they be discovered in the additional parcels. NOAA has reached out to local Tribes to request information about potential

Tribal interest and/or cultural properties in the area, and the SSNERR will continue to seek to engage with local tribes in the future. The SSNERR would comply with the NHPA when engaging in any future research or management activities that may affect historic properties. The addition of the properties to the boundary standing alone would have no potential to affect historic and cultural properties protected under the NHPA.

Boundary Alternative 2B is expected to have the same or substantially similar effects due to the small acreage of these additional parcels. As noted above, there are no known or suspected historic properties in the expansion area.

4.4 Socioeconomic Resources

4.4.1 Alternative 1 (No Action)

As described in Chapter 3.4, the SSNERR generates approximately $6.1 million annually, including $2.3 million in labor income, and provides 65 jobs, according to a recent economic survey completed by NOAA OCM and Eastern Research Group, supported by Pew Charitable Trusts.

Altogether, the spending by the SSNERR and its visitors supports over 66 jobs in Coos County. The Reserve pays staff and spends money locally by purchasing equipment, on boat and auto maintenance, and in other categories related to its operations. SSNERR spending supports over 56 jobs and contributes to $5.3 million in revenue to the region. Visitors come to South Slough to go hiking, view wildlife, kayak, and enjoy other recreational activities. They spend money locally on food, transportation, and recreational equipment. This generates around $850,000 in revenue and supports an additional 10 jobs in the area.

The current socioeconomic benefits would continue under the no action alternative. However, it is possible that, without additional protection from including these areas in the SSNERR MP, the land could continue to be affected by runoff from urban development or agriculture in the surrounding area, and continue to allow runoff to enter the SSNERR. Allowing this continued degradation could have minor negative effects on research and recreation in the long term.

4.4.2 Boundary Expansion Alternatives

With the Boundary Expansion Alternatives, the SSNERR would manage the expansion parcels for research and conservation. The SSNERR's partnerships and research-oriented environmental stewardship would help in maximizing the land use and socioeconomic options in the area. Extending the SSNERR's management and stewardship into the proposed expansion parcels would enhance opportunities for tourism and recreation, yielding direct, long-term, localized benefits to marine area use, recreation, and socioeconomics. Visitors come to South Slough to go hiking, view wildlife, kayak, and enjoy other recreational activities. They spend money locally on food, transportation, and recreational equipment. As stated above, the SSNERR generates around $850,000 in revenue and supports an additional 10 jobs in the area from recreational activities alone, and it is reasonable to anticipate that spending would increase from expanded areas to engage in these recreational activities. The addition of the new property would increase the reach of the SSNERR's lands, allowing for recreational visitors to reach more of the South

Slough region. Additionally, bringing the expanded areas into the reserve will allow SSNERR to apply for federal funding to complete property enhancement projects, such as improved trails, public access points, and restoration projects.

Altogether, the spending by the SSNERR and its visitors currently supports over 66 jobs in Coos County. The Reserve pays staff and spends money locally by purchasing equipment, on boat and auto maintenance, and in other categories related to its operations. Expanding the boundaries will bring in more research and restoration opportunities resulting in increased spending in the local economy.

While the SSNERR must limit public access to certain areas, such as where active research is underway, the SSNERR currently anticipates allowing recreational activities like hunting, hiking, harvesting of shellfish, mushrooms, berries, and other activities to occur in the expanded areas. There are currently no improved trails in the expanded areas, but there are some gated, decommissioned roads used as public walk-in access points.The SSNERR does not intend to limit the public's use of these walk-in areas.

Much of the expanded areas have dense re-growth following clear cut logging that happened prior to the state purchasing the land. SSNERR intends to implement forest thinning/restoration in these areas to promote healthy forest habitats and reduce wildfire risk. All of these improvements would additionally enhance recreation opportunities.

The addition of the expansion parcels would not adversely affect any of the population, including those populations that tend to be disproportionately affected when socioeconomic impacts are experienced. With the addition of the new areas, the SSNERR would continue its ability to provide important stewardship and educational programs. These programs would have minor beneficial impacts for all people, regardless of background or race.

Negative socioeconomic impacts of expanding the boundaries are not anticipated, or would be minor. There is active forestry in the private timberlands and County Forest surrounding the reserve, and some of the lands in the expanded area were purchased from private timber companies after being logged. Since purchasing the land, the State has been managing the expanded areas consistent with the management of the lands in the current SSNERR boundary, so no new logging is permitted. By adding these lands to the SSNERR, commercial forestry will continue to be prohibited. Any potential future revenue from logging and jobs that was lost when the State purchased the land from timber companies could have negative socioeconomic impacts, but these industries have been declining in this area and the potential for commercially viable logging in the expanded areas is somewhat speculative. Any negative socioeconomic impacts from the state purchasing these lands from private timber companies and prohibiting future commercial logging are likely outweighed by the potential economic benefits from increased tourism and recreation opportunities by adding these parcels to the NERR.

Boundary Alternative 2B is expected to have the same or substantially similar effects due to the small acreage of these additional parcels.

4.5 Cumulative Impacts

Potential cumulative effects are assessed to determine the incremental consequences of an action when added to other past, present, and reasonably foreseeable future actions [(40 C.F.R 1508.1 (2022)]. The direct effects of an individual action may be negligible but could contribute to a measurable environmental impact when considered cumulatively with indirect effects and with other past, present, and/or reasonably foreseeable future projects. Cumulative impacts may result from individually-minor but collectively-significant actions taking place over time.

There are no currently proposed projects that are expected to contribute to potential cumulative effects. The Jordan Cove Energy Project was a proposal by energy company Pembina to build a liquefied natural gas export terminal within the Port of Coos Bay, but the proposal was canceled in late 2021. Though there are a few other proposed projects at the Port aimed to improve the South Slough region, these activities are in the early planning stages. While it is too early in the planning stage to predict the effects of the activities conducted at the Port, or any other proposed regional improvement projects, effects of these projects are likely localized and would not be expected to impact the SSNERR.[3]

4.5.1 Cumulative Impacts on the Physical Environment

The Boundary Expansion Alternatives would have little to no potential to have a significant effect on the physical environment (air quality and climate, geology and substrates, and water). However, the expansion would allow for increased and improved monitoring, pollution mitigation, restoration efforts, climate change assessment, and outreach and education programs of the SSNERR.

Climate change is significantly affecting the region, causing warming air temperatures, increasing acidity in nearshore marine waters, increased storminess, wetland loss, and increasing water temperatures. While the NERR does not exacerbate or mitigate greenhouse gas emissions that contribute to climate change, many of the research activities may lead to development of methods to mitigate the regional effects of climate change. As described in 3.1.2, the NERR has a robust research program to assess the effects of climate change in the reserve. Projects including assessing the effects of climate change on tidal wetlands and wetland groundwater levels, emergent marshes, eelgrass beds, and forested wetlands; studying ocean acidification by collecting and analyzing pCO2 and pH data throughout the reserve; and evaluating potential effects of changing water quality (i.e. pH, water temperature) and sea level rise on local biota, including native fish and shellfish.

Water quality

[3] For examples of potential future projects in the Port of Coos Bay, see https://www.portofcoosbay.com/channel-deepening; https://www.portofcoosbay.com/bridge-rehabilitation; https://www.portofcoosbay.com/news-releases/2021/1/22/us-army-corps-of-engineers-releases-workplan-includes-3465-million-to-repair-coos-bays-north-jetty; https://www.opb.org/article/2023/06/22/oregon-coos-bay-shipping-pacific-coast-intermodal-port-project-development/

The proposed action has no potential to adversely affect the physical environment, but combined with other regional efforts to address water quality in the area, it would promote protection of the physical environment of the SSNERR and the South Slough area as a whole in the long-term.

The South Slough does not support a large commercial industry that contributes to significant impacts to water quality in the region, though commercial activity exists on the South Slough where it joins Coos Bay. Additionally, the Oregon Department of Agriculture leases several thousand acres of state-owned submerged lands in the Coos and South Slough estuary for commercial oyster cultivation. The presence of the commercial oyster industry and recreational clam harvest in the estuary encourages maintenance of excellent water quality.

DEQ implements several different measures to address water quality that are relevant to the SSNERR watershed. Section 305(b) of the Federal Clean Water Act (CWA) (33 U.S.C. § 1315(b)) requires states to monitor, assess and report on the quality of its waters relative to designated uses established in accordance with their water quality classification. The Oregon Department of Environmental Quality (DEQ) conducts in-depth assessment plans which describe water quality conditions and include recommendations for actions that DEQ and others who are interested in these basins can take to improve water quality. In 2014, DEQ prepared a basin status and action plan for the South Coast Basin, which includes the Coos Subbasin.[4] Section 303(d) of the Clean Water Act (33 U.S.C. § 1313(d)) requires each state to list waters not meeting water quality standards and prioritize those waters for Total Maximum Daily Load development (TMDL) or other management. TMDLs provide the framework for restoring impaired waters by establishing the maximum amount of a pollutant that a waterbody can receive without adverse impact to fish, wildlife, recreation, or other uses. DEQ is in the scoping and information gathering phase for developing a TMDL for the Coos Subbasin.[5] Section 319 of the CWA, 33 U.S.C. § 1329(b) requires the governor of each state to prepare and submit to the U.S. Environmental Protection Agency a management program plan[6] for controlling pollution added from nonpoint sources and improving water quality. Approval of this plan makes the state eligible for Federal grant funds to implement the program, including restoring riparian areas and monitoring.[7] Finally, DEQ has begun a rulemaking to update the existing aquatic life use subcategory designations relating to Oregon's temperature standard, and to designate aquatic life use subcategories relating to Oregon's dissolved oxygen standards. The subcategories associated with the existing temperature standard will be updated based on newly available data, and the subcategories associated with the dissolved oxygen standard will be designated in rule for the first time.[8]

The boundary expansion would be expected to complement DEQ's efforts to address water quality in the Coos Subbasin by providing additional funds for water quality monitoring and restoration projects in the SSNERR.

---

[4] https://www.oregon.gov/deq/FilterDocs/BasinSCoastWARep.pdf

[5] https://www.oregon.gov/deq/wq/tmdls/Pages/TMDLs-South-Coast-Basin.aspx.

[6] DEQ's most recent 319 plan is from September 2022, and is available at https://www.oregon.gov/deq/FilterDocs/npsplanF.pdf.

[7] See 2021 Annual Report for a list of grant projects funded in 2021. https://www.oregon.gov/deq/wq/Documents/npsAnnualRep2021.pdf

[8] https://www.oregon.gov/deq/rulemaking/Pages/aquaticlife2022.aspx

4.5.2 Cumulative Impacts on the Biological Environment

This action may benefit the biological environment in many ways. For example, the inclusion of the expansion parcels in the SSNERR would allow for habitat restoration and invasive species management efforts in the proposed parcels, which would positively affect wildlife species throughout the South Slough region. Additionally, inclusion of the expansion parcels in the SSNERR would extend the monitoring and research efforts of the SSNERR which would allow for more robust wildlife data for the South Slough region. The administering of environmental stewardship actions in the extended parcels would promote the environmental integrity of the region and thus prevent further anthropogenic harm to the surrounding biological environment. There are a number of ongoing/future biological stewardship activities in the region, including the Coos Basin Coho Partnership[9] and the Western Oregon Stream Restoration Program[10], which help contribute to the health of the biological environment in the vicinity of the SSNERR.

4.5.3 Cumulative Impacts on Cultural and Historical Resources

The expansion of the SSNERR is not expected to have an adverse impact on any cultural or historic resources. The addition of the expansion parcels would allow for the further protection of historical resources in the South Slough. Currently, the SSNERR protects and manages its existing cultural and historic resource sites in accordance with the NHPA and state law, and would extend those efforts to the additional sites formally under the MP, under the Boundary Expansion Alternatives. Should any additional cultural or historic resources be discovered within the proposed boundary expansion area in the future, the comprehensive management approach afforded by NOAA would provide important protection and research capacities allowing for their appropriate conservation and documentation in accordance with the NHPA. The SSNERR designation of these additional areas is not anticipated to have an effect on historic properties protected under NHPA. NOAA anticipates that the proposed action could allow for additional opportunities for consultation and potential protection. Conversely, the No Action Alternative could limit the cohesive protection of any historical properties found within the expansion parcels as a result of not being included in the approved management boundary.

4.5.4 Cumulative Impacts on Socioeconomic Resources

The expansion of the SSNERR is not expected to have a significant impact on socioeconomic resources. However, it is possible that extending Reserve's management into the proposed expansion area would advance opportunities for research, education, tourism, and recreation, which may result in long-term cumulative benefits to socioeconomic status of the South Slough area. As explained earlier, commercial uses such as timber are declining in this area, and the recreation industry is growing. Socioeconomic activities at the current SSNERR that include educational programs, tourism, kayaking, hunting, fishing, boating, hiking, and biking, and will contribute beneficially to the growing recreation industry. The expansion of the boundary would not restrict community participation in recreational activities and would provide additional opportunities to extend the educational programs already in place in the current SSNERR boundary, resulting in minor cumulative socioeconomic benefits. Increased visitation to the

[9] https://coastcoho.org/strategic-action-plan-for-coho-salmon-recovery-on-the-coos-basin/
[10] https://www.dfw.state.or.us/habitat/wosrp.asp

SSNERR for recreation or tourism could result in increased visitor spending, thus causing a positive cumulative impact on the South Slough local economy. Increased recreational uses in the region and SSNERR are not anticipated to cause cumulative adverse effects.

Chapter 5 Compliance with Other Laws

In addition to compliance with NEPA, OCM has complied with other environmental and administrative review requirements, including those listed below, as part of its consideration of the proposed action to change the South Slough NERR boundary. If OCM decides in the future to award funding to the SSNERR, OCM would conduct any additional environmental reviews required by law for those funded future projects at that time.

Coastal Zone Management Act - Under the Coastal Zone Management Act (CZMA) (16 U.S.C. §§ 1451, *et seq.*) the federal agency must submit a Consistency Determination to the state if the federal agency determines the activity may have reasonably foreseeable effects on the state's coastal uses or resources. 15 C.F.R. § 930.34(a)(1). Federal agency activities must be consistent to the maximum extent practicable with the enforceable policies of the state's CMP. If there are no reasonably foreseeable effects, the federal agency may be required to provide a Negative Determination to the state. *See* 15 C.F.R. § 930.35.

Compliance: NOAA has determined that the proposed action will not have any reasonably foreseeable effects on Oregon's coastal uses or resources. Should further actions warrant it, a Consistency Determination to the OR Coastal Management Program explaining that the proposed action is consistent with the enforceable policies of OR's Coastal Management Program will be completed at that time.

Endangered Species Act - Section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. § 1536), requires that each Federal agency shall, in consultation with the with the National Marine Fisheries Service (NMFS) or the U.S. Fish and Wildlife Service (USFWS) (collectively, the Services) ensure that any action it authorizes, funds, or carries out is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of critical habitat for those species. Consultation may be formal or informal. Informal consultation is appropriate when a Federal agency's actions "may affect but are not likely to adversely affect" listed species or critical habitats. The Services will concur with such a finding if the effects on listed species are expected to be discountable, or insignificant, or fully beneficial. Formal consultation with the Services and preparation of a biological assessment is required for actions that "may affect and are likely to adversely affect" listed species or critical habitats. The Services will prepare a biological opinion of the effects of the agency action, and will issue a permit authorizing the incidental take of listed species as long as the action is not likely to jeopardize the continued existence of a listed species. Incidental take statements for marine mammals may not be included in a take statement until regulations, authorizations, or permits under MMPA 101(a)(5) are completed.

Compliance*:* Chapter 3 lists the species and habitats identified by the Services as having the potential to occur within the proposed action area, or sufficiently near the action. OCM discussed the action with USFWS and has concluded that this administrative action of expanding the boundary will have no effects on species listed as threatened or endangered, nor will it affect

critical habitat of any listed species. OCM also received technical guidance from NMFS that the action will have no effects on NMFS listed species. OCM would initiate consultation with NMFS or FWS for future funding of any projects in the current or expanded boundaries that may affect threatened or endangered species.

Magnuson-Stevens Fishery Conservation and Management Act: The Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. §§ 1801 et seq.), as amended and reauthorized by the Sustainable Fisheries Act (Public Law 104-297), established a program to promote the protection of Essential Fish Habitat (EFH) for Federally-managed species in the review of projects conducted under federal permits, licenses, or other authorities that affect or have the potential to affect such habitat. After EFH has been described and identified in fishery management plans, Federal agencies are obligated to consult with NMFS with respect to all actions, or proposed actions, authorized, funded, or undertaken, by the agency that may adversely affect EFH. An adverse effect is defined as any impact that reduces quality or quantity of EFH.

Compliance: The administrative action of expanding the boundary would have no effects on EFH. Operating a NERR, including with expanded boundaries, is expected to have long-term, minor beneficial impacts on EFH by contributing to habitat enhancement, improving scientific knowledge associated with EFH, and encouraging the protection of EFH. New research conducted under the auspices of the Reserve might allow resource managers to understand and mitigate adverse effects to EFH from projects implemented in the area surrounding the Reserve. With respect to activities conducted in the water, analysis of alternative designs, options for installation, and appropriate best management practices by Reserve partners can lessen or eliminate potential adverse effects on EFH. As projects are proposed and at other appropriate times, OCM will consult with NMFS about the potential for funding other actions (e.g., deployment of new monitoring equipment for the Reserve) that might adversely affect EFH. For this proposed action, however, there is insufficient specific information available about future in-water activities to assess their potential to adversely affect EFH. EFH consultation with Habitat Conservation Division staff in NOAA Fisheries' West Coast Regional Office will occur, as needed, to avoid, minimize, or offset any adverse impacts to EFH, consistent with procedures outlined in the EFH federal consultation regulations at 50 C.F.R. § 600.920, and associated guidance.

The Marine Mammal Protection Act: The Marine Mammal Protection Act (MMPA) of 1972 (16 U.S.C. §§ 1361 et seq.), as amended, prohibits, with certain exceptions, the "take" of marine mammals in U.S. waters and by U.S. citizens on the high seas, as well as the importation of marine mammals and marine mammal products into the U.S. The Act is intended to work in concert with the provisions of ESA. There are some exceptions to the prohibitions on taking marine mammals, including a mechanism for requesting authorization from NMFS's Office of Protected Resources for "incidental," but not intentional, taking, of small numbers of marine mammals by U.S. citizens who engage in a specified activity (other than commercial fishing or directed research on marine mammals) within a specified geographic region. The MMPA and regulations adopted thereunder restrict harassment (meaning any act of pursuit, torment, or annoyance that has the potential to injure a marine mammal in the wild or that has the potential

to disturb a marine mammal in the wild by causing disruption of behavioral patterns, including breathing, breeding, feeding, migration, and sheltering).

Compliance: The proposed action is not expected to adversely affect stocks of marine mammals as defined in the Marine Mammal Protection Act, involve the direct take of, or result in the incidental take of, any marine mammals, as the expansion of SSNERR's boundary is an administrative action. .Incorporation of the safeguards used to protect threatened or endangered species during implementation of projects by SSNERR staff would, in general, be expected to reduce the potential for take of any marine mammals in the area. However, future actions will be evaluated individually for compliance with all applicable mandates, including the MMPA. Other mitigation measures will also be considered, if needed, such as time of year restrictions for projects or boating speed restrictions. If take is anticipated from future projects, the NERR would seek the appropriate authorization or permit from NMFS under the MMPA. Therefore, the Reserve's proposed boundary change and implementation of the associated federal actions described herein would comply with the MMPA.

National Historic Preservation Act -The National Historic Preservation Act of 1966 (NHPA) (54 U.S.C. §§ 300101 *et seq*.) requires federal agencies to take into account the effects of their undertakings on historic properties in accordance with regulations issued by the Advisory Council on Historic Preservation (ACHP) at 36 C.F.R. part 800. The regulations require that federal agencies consult with states, tribes, and other interested parties (consulting parties) when making their effects determinations. The regulations establish four basic steps in the NHPA 106 process: determine if the undertaking is the type of activity that could affect historic properties, identify historic properties in the area of potential effects, assess potential adverse effects, and resolve adverse effects.

Compliance: OCM sent a letter to the Oregon State Historic Preservation Office on January 6, 2023, explaining that the action of expanding the reserve boundary to include the additional parcels (the undertaking) will have no potential to affect historic and cultural properties protected under the NHPA. This undertaking is managerial in nature, and does not involve any ground-moving activities that could disturb sites or their viewshed. Should NOAA provide any funds for any physical disturbance in the future, OCM will conduct a Section 106 consultation on that project at that time. OCM received no response from the Oregon State Historic Preservation Office.

Executive Order 12898- Environmental Justice -To be consistent with the President's Executive Order 12898 on Environmental Justice (February 11, 1994), Executive Order 12948 (Amendment to Executive Order 12898), and the Department of Commerce's Environmental Justice Strategy, applicants must ensure that their projects will have no disproportionately high and adverse human health or environmental effects on minority or low-income populations. Federal agencies must analyze the effects of proposed programs, policies, and activities on minority and low-income populations, including Indian Tribes.

***Compliance*:** The proposed action does not have a disproportionately high and/or adverse human health or environmental effects on minority or low-income populations. The proposed incorporation is for environmental protection and has no direct impact on the residents or visitors

of the NERR. The incorporation of the additional parcels is management-based and does not involve any disruptive activities.

Executive Order 13175 - Tribal Consultation – Executive Order 13175, "Consultation and Coordination with Indian Tribal Governments" requires federal agencies to engage in government-to-government consultation with federally-recognized tribes at the earliest practicable time it can reasonably anticipate that a proposed policy or initiative may have tribal implications. If a proposed action may have tribal implications, the office proposing the action should, at the earliest time practicable, review the NOAA 13175 Policy to determine whether tribal consultation should be initiated.

Compliance: NOAA has sent letters to the local Tribes of the SSNERR region, inviting their participation and comment on the boundary expansion, and to invite federally recognized tribes to request formal government-to-government consultation on any tribal implications. No responses were received.

Chapter 6 Acknowledgements

6.1 List of Preparers

Mary Clare McGinn, Lynker

Brian Bloodworth, OCM - Advisor

Patmarie S. Nedelka, OCM - Advisor

6.2 Agencies/Personnel Consulted

Bree Turner, OCM

Bree Yednock, SSNERR Manager

Chapter 7 References

15 C.F.R Part 921. National Estuarine Research Reserve System Regulations

16 U.S.C. § 1461. National Estuarine Research Reserve System (Section 315) (2005)

Denike, J., B. York, B. Hora, H. Crombie, C. Sheridan, and S. Rumrill. 1993. Inventory of riparian habitats and streams within the South Slough National Estuarine Research Reserve, Oregon. Unpublished field data (1993). South Slough National Estuarine Research Reserve, Charleston, OR.

Hill A. (2020, September 16). Why U.S. wildfires will only get worse. Council on Foreign Relations.

Lance, M., J. Hodder, S.S. Rumrill, and M. Graybill. 1993. Assessment of the impact of Pacific Power electrical lines on populations of migratory and resident birds that inhabit the South Slough estuary, OR (Sep 1992 – Apr 1993). South Slough Technical Project Report. 27 pp.

Magwire, C. 1976. Mammal populations of the Coos Bay salt marshes. In A comparative study of salt marshes in the Coos Bay estuary (J. Hoffnagle et al., eds.) pp. 191-200. NSF / Student Originated Study, University of Oregon.

Meadows, G. (2022, December 9). *Coos County Economic Outlook Forum shows positive trends*. KPIC 4. Retrieved January 10, 2023, from https://kpic.com/news/local/coos-county-economic-outlook-forum-shows-positive-trends-unemployment-poverty-level-shipping-port-of-coos-bay-curry-county-inflation-jobs-income

National Ocean Service, OCM (n.d.). The Nation's Coastal Management Agency. Accessed at https://coast.noaa.gov/about/

NOAA, 1974. South Slough National Estuarine Research Reserve Final Impact Statement and Management Plan.

NOAA, 2017. The National Estuarine Research Reserve System Strategic Plan 2017-2022.

Puls, A. 2001. Advective tidal transport and delivery of meroplanktonic larvae into the South Slough estuary, OR. Master's thesis progress report. University of Oregon, Oregon Institute of Marine Biology. 52 pp.

Reserve website: https://coast.noaa.gov/nerrs/reserves/south-slough.html

Service, 2019 (available at *https://www.fws.gov/arcata/* and at *http://www.regulations.gov* under Docket No. FWS-R8-ES-2018-0076).

South Slough National Estuarine Research Reserve Management Plan 2015 - 2022 https://coast.noaa.gov/data/docs/nerrs/Reserves_SOS_MgmtPlan.pdf

South Slough Site Profile: https://coast.noaa.gov/data/docs/nerrs/Reserves_SOS_SiteProfile.pdf

Simenstad, C.A., K.L. Fresh, and E.O. Salo. 1982. The role of Puget Sound and Washington coastal estuaries in the life history of Pacific salmon: an unappreciated function. In Estuarine comparisons (V. S. Kennedy, ed.) pp. 343-364. New York: Academic Press.

Simenstad, C.A. 1983. The ecology of estuarine channels of the Pacific Northwest coast: a community profile. U.S. Fish and Wildlife Service FWS/OBS-83/05. 181 pp.

Top 10 Best Coos County Public Schools (2023). Public School Review. Retrieved January 10, 2023, from https://www.publicschoolreview.com/oregon/coos-county

U.S. Census Bureau, Coos County, 2021

Chapter 8 Appendices (via weblink)

Appendix A: IPaC Report

Appendix B: FWS ESA Consultation

Appendix C: Federal Consistency Determination