Final Environmental Assessment

Siletz Bay National Wildlife Refuge
Drift Creek Unit
Habitat Restoration

June 2023

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Introduction

The U.S. Fish and Wildlife Service (Service, USFWS) is a Federal agency whose primary mission is conserving and enhancing the Nation's fish and wildlife populations and their habitats for the American public. Although the Service shares this responsibility with other federal, state, tribal, local, and private entities, the Service has specific legally mandated responsibilities for migratory birds, federally listed threatened and endangered species, and certain anadromous fish and marine mammals. Service efforts over the last 100 years to protect wildlife and their habitats have resulted in a network of protected units that constitute the National Wildlife Refuge System (Refuge System). This network of protected lands and waters is the largest and most diverse in the world. Refuge System lands provide essential habitat for numerous fish and wildlife species, wildlife-dependent recreational opportunities for the public, and a variety of benefits to local communities.

This Environmental Assessment (EA) has been prepared to evaluate the effects associated with the Service's proposed action to restore estuarine-associated habitats within three tracts in the Drift Creek Unit of Siletz Bay National Wildlife Refuge (NWR, Refuge). This EA complies with the National Environmental Policy Act (NEPA) in accordance with Council on Environmental Quality regulations (40 Code of Federal Regulations [CFR] 1500–1509) and Department of the Interior (43 CFR 46; 516 Departmental Manual [DM] 8) and U.S. Fish and Wildlife Service (550 Fish and Wildlife Service Manual [FW] 3) regulations and policies. NEPA requires examination of the effects of proposed actions on the natural and human environment. Appendix A outlines the laws and executive orders evaluated through this EA.

The EA provides information to the Service's Responsible Official in order to determine whether an environmental impact statement (EIS) or a finding of no significant impact (FONSI) can be prepared (40 CFR 46.300). An EIS would be prepared if significant environmental impacts are anticipated as a result of the Service's decision to restore estuarine-associated habitats along lower Drift Creek. As such, this EA addresses only those resources or features that have the possibility to be significantly impacted and are important to the decision-making process. Resources or other aspects of the natural and human environment that would be only negligibly impacted and, therefore, not important to the decision-making process are not addressed in this EA.

Purpose and Need for the Action

The purpose of this proposed action is to restore estuarine-associated habitats in the Drift Creek Unit of the Siletz Bay NWR to improve habitat for native fish and wildlife, including threatened coho salmon.

The project is needed to address the historical loss of tidal wetlands and estuarine salmonid habitat and to increase resiliency of new and existing tidal wetland habitats to sea level rise (SLR), and other effects of climate change. Salmonids within the Siletz watershed include threatened coho salmon, Chinook salmon, steelhead, and coastal cutthroat trout. These species and many other estuarine-dependent fish and wildlife would benefit from restoration of floodplain connectivity and improved habitat complexity. These actions also would help the Service meet priorities outlined in the National Wildlife Refuge System Administration Act (16 U.S.C. 688dd–688ee, et seq.; Administration Act), as amended by the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57, Improvement Act); support the Refuge System mission; and be consistent with the purposes of the Refuge and several habitat goals identified in the Comprehensive Conservation Plan for the Siletz Bay NWR (USFWS 2013; available at https://ecos.fws.gov/ServCat/Reference/Profile/43347), including:

- Goal 2: Restore, enhance, protect, and maintain estuarine habitats characteristic of the North Pacific Coastal Ecosystem,
- Goal 3: Protect and maintain forested wetlands and stream-riparian habitat characteristic of the North Pacific Coastal Ecosystem, and
- Goal 4: Enhance, protect, and maintain instream aquatic habitat for all dependent species including anadromous and estuary-dependent fish.

Cooperating Agencies

The Service is the lead federal agency for the preparation of this EA. The National Oceanic and Atmospheric Administration (NOAA) is a cooperating agency because they have special expertise and knowledge of coastal and marine environmental resource issues.

NOAA's Restoration Center funds and conducts habitat improvement and restoration projects in the Nation's coastal and marine environments, to ensure sustainable fishery production and administration of federally protected fish and wildlife resources. Restoration Center technical staff work with public, private, and government partners on restoration project designs to ensure environmental compliance and maximize restoration project success. As a cooperating agency, NOAA works with the Service and the project applicants on reviewing alternatives and the analysis of potential environmental impacts presented in this EA.

NOAA will use the analyses in this EA to inform its decision-making process on continued funding support of the lower Drift Creek restoration through their Community-Based Restoration Program.

Proposed Action

The Service proposes to restore approximately 74 acres of estuarine-associated habitats in the Drift Creek Unit of the Siletz Bay NWR to improve habitat for anadromous fish, migratory birds, and a diverse array of other native fish and wildlife. This proposal includes dike removal; realignment of drainage ditches and initiation of primary, secondary, and tertiary tidal channels; placement of wood habitat structures; removal of channel obstructions; creation of topographic diversity; control of invasive plant species including reed canarygrass; and planting and seeding to help restore native marsh, shrub swamp, Sitka spruce swamp, and riparian vegetation.

A proposed action is often iterative and may evolve during the NEPA process as the agency refines its proposal and gathers feedback from the public, tribes, and other agencies. The Proposed Action as described in this Final EA has been modified based on comments received during the public review process.

Background

Legal and Policy Guidance

National wildlife refuges are guided by the mission and goals of the Refuge System, the purposes of an individual refuge, Service policy, and laws and international treaties. Relevant guidance includes the Administration Act, as amended by the Improvement Act, and selected portions of the Code of Federal Regulations and U.S. Fish and Wildlife Service Manual. Additional details are provided within Chapter 1 of the Refuge's Comprehensive Conservation Plan (USFWS 2013; CCP). A complete list of laws pertaining to the Service and the Refuge System can be found at http://laws.fws.gov.

The mission of the Refuge System, as outlined by the Administration Act, as amended by the Improvement Act, is

> *"… to administer a national network of lands and waters for the conservation, management and, where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans…."*

Additionally, the Administration Act mandates the Secretary of the Interior in administering the Refuge System (16 U.S.C. 668dd(a)(4)) to:

- Provide for the conservation of fish, wildlife, and plants, and their habitats within the Refuge System;
- Ensure that the biological integrity, diversity, and environmental health of the Refuge System are maintained for the benefit of present and future generations of Americans;
- Ensure that the mission of the Refuge System described at 16 U.S.C. 668dd(a)(2) and the purposes of each refuge are carried out;
- Ensure effective coordination, interaction, and cooperation with owners of land adjoining refuges and the fish and wildlife agency of the states in which the units of the Refuge System are located;
- Assist in the maintenance of adequate water quantity and water quality to fulfill the mission of the Refuge System and the purposes of each refuge;
- Recognize compatible wildlife-dependent recreational uses as the priority general public uses of the Refuge System through which the American public can develop an appreciation for fish and wildlife;
- Ensure that opportunities are provided within the Refuge System for compatible wildlife-dependent recreational uses; and
- Monitor the status and trends of fish, wildlife, and plants in each refuge.

To provide refuges with implementation guidance for ensuring that the biological integrity, diversity, and environmental health (BIDEH) of the Refuge System are maintained for the benefit of present and future generations of Americans, the Service developed the BIDEH policy (601 FW 3). This policy provides (1) guidance for consideration and protection of the broad spectrum of native fish, wildlife, and habitat resources that represent BIDEH on refuges and in associated ecosystems and (2) a process for evaluating the best management direction to prevent the additional degradation of environmental conditions and to restore lost or severely degraded environmental components. In evaluating these factors, the Service looks at historic conditions and compares them to the current ones. This provides a benchmark of comparison for the relative intactness of ecosystems' functions and processes, as well as an assessment of the opportunities and limitations to restoring BIDEH.

Per the Improvement Act, refuge purposes are "*specified in or derived from the law, proclamation, Executive order, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, refuge unit, or refuge subunit*." Siletz Bay NWR was established in 1991 under the authority of the Fish and Wildlife Act of 1956 "*for the development, advancement, management, conservation, and protection of fish and wildlife resources*" [U.S.C. 742f(a)(4)] and "*for the benefit of the United States Fish and Wildlife Service, in performing its activities and services*" [16 U.S.C. 742f(b)(1)]. Additional establishment authorities include the Emergency Wetlands Resources Act of 1986 [16 U.S.C. 39 100 Stat

3583], with the purpose of acquisition for "*the conservation of the wetlands of the Nation in order to maintain the public benefits they provide and to fulfill international obligations contained in various migratory bird treaties and conventions*"; and the Endangered Species Act of 1973 [16 U.S.C. 1534)], with the purpose "*to conserve (a) fish or wildlife which are listed as endangered species or threatened species…or (b) plants.*" Funding was authorized by the Land and Water Conservation Fund of 1965.

Project Area Overview

Siletz Bay National Wildlife Refuge is located along the central Oregon Coast, in Lincoln County (Figure 1). The Refuge is situated just south of Lincoln City. The Refuge contains 572 acres within the Siletz Bay watershed (USFWS 2020). Siletz Bay is designated by the Oregon Department of Fish and Wildlife (ODFW) as a Conservation Opportunity Area in the State's Conservation Strategy (ODFW 2016). It is also a designated Important Bird Area (National Audubon Society 2022) and supports a wide variety of plants, invertebrates, mammals, and fish, including the threatened Oregon Coast Evolutionary Significant Unit (ESU) of coho salmon and Oregon's only coastal origin population of summer steelhead trout.

The Siletz estuary once had over 1,072 acres of tidal wetlands, including marshes, scrub-shrub, and spruce swamp habitat (Brophy 2019). Tidal wetlands are vegetated lands that are alternately flooded and exposed by estuary waters. The estuary also had large amounts of fallen trees, unlike other estuaries in the immediate area. These wetlands and large woody debris provided a complex mosaic of habitats that supported rich biodiversity. Over the last 150 years, much of the original vegetated wetland habitat of the estuary was lost to agriculture and infrastructure as people cleared, drained, ditched, tide-gated, grazed cattle, trapped and killed beavers, and removed fallen trees. About 43.5% of the original tidal marsh, 99.2% of tidal scrub-shrub, and 78.1% of tidal forested habitat in Siletz Bay has been lost since the 1850s (Brophy 2019).

Siletz Bay NWR lands consist primarily of tidal marsh, diked former tidal wetlands affected by varying levels of muted tidal action (i.e., restricted flows), and several smaller forested parcels, both upland and wetland. The diked wetlands remain as freshwater wetlands but have been cut off or greatly restricted from tidal action by the historic construction of dikes and water control structures. Restoration to return these ecosystems to their natural state of twice-daily tidal inundation has been a focus of Refuge management (USFWS 2013). For more information regarding the general characteristics of the Refuge's environment, please see Chapters 3, 4, and 5 of the Refuge's CCP (USFWS 2013).

The proposed action is located on the Shaffer, Watson, and Kangas Tracts within the Drift Creek Unit of the Refuge, which are located on the east side of U.S. Highway 101 (hereafter referred to as Highway 101) at Drift Creek (Figure 1). Historically, these three tracts were situated within a contiguous and connected estuarine complex of tidal wetlands, including tidal marsh and

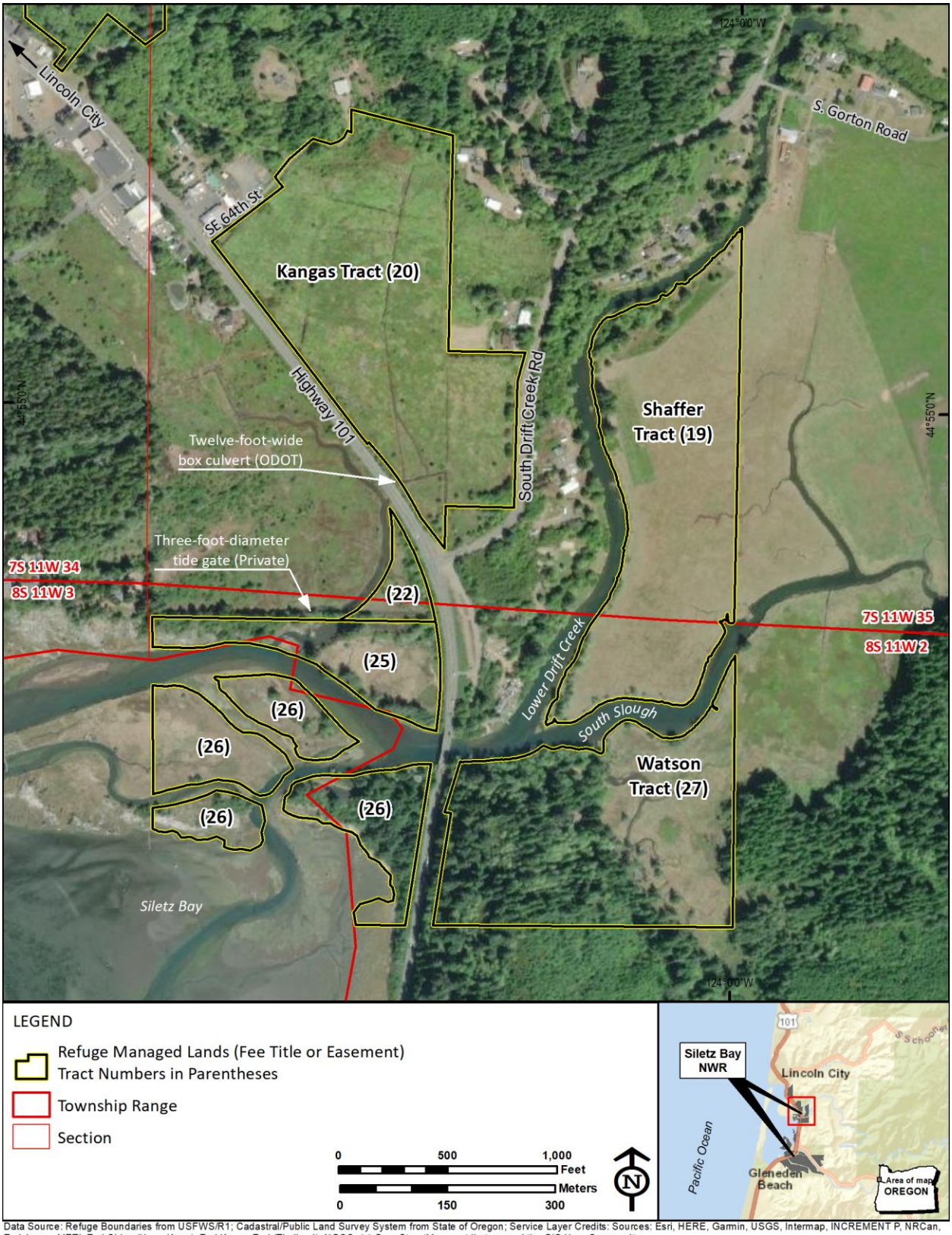
floodplain overflow areas dominated by spruce forested wetlands. These tracts were diked, drained, and converted to pastureland for livestock grazing. Now, the tracts are primarily muted tidal wetlands that receive restricted tidal influence (Brophy 2001, 2002).

The Shaffer Tract (Tract 19) is bounded by Drift Creek to the west and South Slough to the south. It is predominated by high-marsh elevations (i.e., above mean high water [MHW]) and has numerous remnant tidal channels prevalent on its surface. A severe flood in the late 1990s resulted in the complete loss of a water control structure on private land located adjacent to the southeast corner of the tract. The loss of this water control structure, along with subsequent breaches in the dikes adjacent to, and along Drift Creek, now allow muted tidal flows on the tract.

The portion of the Watson Tract (Tract 27) within the project area is located south of the South Slough tidal channel and east of the Refuge residence. This area is also a diked tidal marsh with muted tidal flow and a mix of low to high marsh habitats and tidal spruce swamp. A tide-gated culvert formerly existed at the northwest corner of the site. Upon failure, tidal flow now enters the site but is restricted by beaver dams and a narrowed channel.

The Kangas Tract (Tract 20) is bounded to the west by Highway 101; on the north by Southeast 64th Street; and on the east by South Drift Creek Road. Private lands border Service-managed lands to the north, northeast, and south. Most of the tract is now a freshwater wetland circulated by a network of drainage ditches remnant from its agricultural history. Until the late 1990s, the area was heavily grazed and hayed for cattle forage. Since the termination of grazing, native sedges now occur over much of the site; however, invasive vegetation, such as reed canarygrass and Scotch broom, is also present. The ditches on the tract receive extremely muted tidal flows through a failing, undersized (three-foot-diameter) tide-gated culvert on private property on the west side of Highway 101, and through a twelve-foot-wide by six-foot-deep concrete box culvert under the Highway 101, which was placed by the Oregon Department of Transportation (ODOT) in 2012. There is a ditch and steep embankment along Highway 101 near the box culvert. Beaver dams in the ditches and plugging of the Highway 101 culvert have caused water inundation on some parts of the tract and occasional flooding of private lands on the east side.

Figure 1. Drift Creek Unit



Data Source: Refuge Boundaries from USFWS/R1; Cadastral/Public Land Survey System from State of Oregon; Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Alternatives

This EA evaluates two alternatives: the no-action alternative (Alternative A), and proposed action alternative (Alternative B, the preferred alternative). Actions on private lands are beyond the Refuge's jurisdiction, are not included in any alternative, and are outside of the scope of the EA.

Alternative A – Current Management Strategies [No-Action Alternative]

The no-action alternative represents the current management of the project area. This means no new actions would be taken, where management of the Refuge would stay the same as per the CCP (USFWS 2013). Alternative A would continue to protect and maintain approximately 74 acres of muted tidal marsh until additional lands are acquired within the approved refuge boundary (defined as the area within which the Service has authority to acquire and/or manage lands through various agreements) from willing sellers to facilitate tidal restoration, where appropriate. For additional information, see Section 2.3 (Description of Management Direction) and Section 2.4, Objective 2.3 (Protect and maintain muted tidal marsh until restored to salt marsh) in the CCP (USFWS 2013).

Native vegetation would continue to be enhanced and/or maintained and invasive plant species controlled using appropriate integrated pest management (IPM) techniques including mechanical/physical, chemical, biological, and cultural means. For additional information on the Refuge's IPM program, see Chapter 2 (Management Direction) and Appendix G (Integrated Pest Management) in the CCP (USFWS 2013).

Alternative B – Restoration and Improvement of Additional Estuarine Habitat [Preferred Alternative]

The preferred alternative is to restore approximately 74 acres of historic tidal wetlands on the Shaffer, Watson, and Kangas Tracts through the removal of dikes; realignment of drainage ditches and initiation of primary, secondary, and tertiary tidal channels; placement of wood habitat structures; removal of channel obstructions; creation of topographic diversity; and the restoration of native vegetation by planting and seeding native plants while controlling invasive plants. The proposed actions would only occur on Refuge lands.

Following restoration, the affected acreage would be managed under the following CCP objectives (USFWS 2013):

- Objective 2.1: Enhance, protect, and maintain salt marsh,
- Objective 2.2: Protect and maintain intertidal mudflats,
- Objective 3.1: Protect and maintain wet-mesic Sitka spruce-western hemlock forest (and adjacent riparian habitat), and
- Objective 4.1: Enhance, protect, and maintain instream aquatic habitat.

The CCP objectives include descriptions of desired future habitat attributes as well as strategies that would be applied to achieve the objectives.

Proposed Actions Common to All Tracts

Design for Tidal Channel Network Restoration and Enhancement

Multiple lines of evidence, including 1939 aerial imagery and statistical relationships developed from mature marshes in San Francisco Bay (PWA and Faber 2004), the Skagit and Stillaguamish deltas (Hood 2007), and Millport Slough in Siletz Bay NWR (So et al. 2009, W2r 2022) would be used to determine the alignments, distribution, size, and depth of tidal channels on the Shaffer, Watson, and Kangas Tracts. Channel sinuosity (i.e., how much a channel deviates from a perfectly straight path) and general planform (i.e., shape) would be intended to match observed tidal channel characteristics at Millport Slough in Siletz Bay NWR, which is a minimally altered site with similar marsh elevations and drainage areas as the proposed project site. Final channel geometries would consider the results from these assessments, hydrologic modeling, site-specific construction considerations, and natural design constraints.

In addition to primary and secondary tidal channels, pilot tertiary channels would be incorporated into the channel networks on all tracts. These channels would be relatively shallow and short and intended to connect subtle low areas and existing native marsh vegetation. These channels would be designed to have positive drainage towards primary and secondary channels and help to drain potential mosquito breeding areas. The excavated spoils from these tertiary channels would be side cast by the excavator into low, discontinuous mounds and planted for additional topographic and vegetation diversity.

Project Design Features

Wood Habitat Structures:

Large wood (e.g., logs, stumps, and trees) would be incorporated into the restoration of each tract, as appropriate, to emulate a mature spruce swamp (i.e., where spruce trees have fallen onto the floodplain and into the tidal channels). The large wood would provide organic substrate and cover habitat in the channel for native fish and macroinvertebrates and create some hydraulic heterogeneity (scour pools). Wood habitat structure would include logs that span the tidal channel, logs placed along channel toes, pier (or pin) logs that mimic vertical snags, logs placed throughout the floodplain, and partially buried nurse logs (i.e., decaying logs that serve as substrate for other plants to grow on). Large wood would be contributed by the Bureau of Land Management (BLM) and MidCoast Watersheds Council.

Avoidance and Minimization Measures

Pre-construction and site preparation activities at all tracts would include mobilization of crews, equipment, and supplies; preparing and providing for traffic control, as necessary; installing construction access, temporary crossings, and staking; establishing erosion and sediment control measures; establishing pollution and invasive species prevention measures; removing fish from ditches and relocating, if necessary; and staging large woody debris.

The proposed action would implement the following measures at all three tracts, as appropriate, to minimize adverse effects on the physical environment:

a. All erosion and sediment control best management practices (BMPs) would be constructed and maintained in accordance with Federal and State requirements and guidelines, as well as professionally accepted wetland restoration standards and techniques to protect water quality and the ecological integrity of the proposed project site.
b. All machinery would be cleaned using standard high-pressure or steam washing processes prior to entry onto Refuge lands to avoid contamination of the proposed project site and surrounding land and water from grease, oil, and other petroleum products, as well as the potential introduction of invasive plant seeds or plant materials, or other foreign objects or materials.
c. Graveled construction entrances and/or track-out pads (e.g., 50-yard section of road with 3" to 6"-minus rock) to remove excess mud from tires and tracks would be installed at the entrance/exit and/or along the access routes, respectively, where trucks and excavators would be entering/exiting the proposed project site.
d. Earthmoving activities would take place during the typical construction season in coastal Oregon. If activities are expected to extend outside of the commonly accepted construction period, the local offices of each Federal and State consulting or permitting agency would be contacted to determine if additional Project Design Features and/or Avoidance and Minimization Measures would be necessary to continue the work.
e. To minimize the effects on anadromous fish survival caused by the mobilization of sediments, the Service would require staff, contractors, and sub-contractors to use silt trapping devices (e.g., turbidity curtains, weed-free straw wattles, etc.) during all in-water work, or work where sediment could potentially enter the water (e.g., during the removal or lowering of existing dikes along Drift Creek). Service staff, contractors, and sub-contractors would ensure that sediment-control devices are installed and maintained correctly through daily inspection of the erosion control devices. Controls would be immediately repaired or replaced and/or additional controls would be installed, as necessary (e.g., installing mud mats to prevent equipment from sinking or creating ruts). Sediment that is captured in these controls may be disposed of on-site with the rest of the excavated spoils. Unintentional depressions caused by moving heavy equipment around the site will be rehabilitated by grading and contouring them to adjacent elevations.
f. Much of the site work would be subject to daily tidal inundation so staff, contractors, and sub-contractors would be required to work around the tide cycle to complete the work under the driest of conditions. All in-water grading would be limited to the ODFW approved in-water work period. Prior to the in-water work period, the Service staff, contractors, and sub-contractors may complete tasks that do not impact existing waters and ditches where aquatic species may be present. These tasks may include dike

removal, regrading, fill, or repair, etc. At minimum, BMPs for in water work would include: (1) scheduling work to minimize duration of in-water disturbance; (2) employing techniques that minimize turbidity when using an excavator/bucket in water; (3) limiting the number and location of water crossings and amending crossings with use of gravel or mud pads, when and where needed; (4) avoiding driving equipment through a flowing channel unless authorized by the Project Manager; and (5) placing excavated material in areas where it cannot re-enter the waterways uncontrolled.

g. Disturbance to existing grades and vegetation would be limited to the bare minimum necessary to accomplish the proposed action. Project implementation would use existing disturbed areas, if possible, as well as existing staging areas, routes of ingress or egress, parking lots, etc. to further limit disturbances to the existing character and integrity of the proposed project site. Areas that are disturbed above mean higher high water (MHHW) would be reseeded or re-planted with native vegetation to facilitate revegetation. Areas below MHHW would be allowed to naturally regenerate, as seeding would not be effective due to daily tidal inundation under existing and proposed conditions. When possible, undisturbed existing vegetation on the project site would be retained between cut/fill areas and channels to help minimize sediment movement on site.
h. Service staff, contractors, and sub-contractors would exercise every reasonable precaution to protect species and their habitats from pollution due to fuels, oils, lubricants, and other hazardous or harmful materials. Bio-degradable hydraulic oil would be a requirement of all heavy equipment operated on site and all equipment would be inspected for leaks, faulty hydraulic systems, etc. prior to entering the proposed project site.
i. Vehicles and equipment that are used during the proposed action would be fueled and serviced in a designated staging area located at least 100 meters away from water with appropriate and adequate spill prevention, absorbance, and containment systems. Spills, leaks, and other problems of a similar nature would be resolved by the operator immediately to prevent unnecessary effects to species and habitats. Service staff, contractors, and sub-contractors would have a plan for the emergency clean-up of any spills of fuel or other material available on site (e.g., spill absorbance and containment system readily available on site).
j. When feasible, construction activities would be isolated from existing channels or other waters by fish exclusion barriers or sediment exclusion methods, following BMPs. During fill or dewatering of existing ditches and other water features, best practices and permit requirements for de-fishing would be followed.
k. All construction material, wastes, debris, trash, fencing, portable toilets, etc. would be removed from the proposed project site once the proposed project has been completed. Waste and other debris would be transported to an authorized disposal area, as appropriate, and per all federal, state, and local laws and regulations.

l. The Service would implement best practices, as appropriate and practicable, described in the Region 1 Practices to Minimize the Introduction of Invasive Species by Service Activities (USFWS 2017) to prevent the colonization and spread of invasive plant species following the completion of the restoration work.

Cultural Resources Protection

Cultural and historic resources on refuges receive protection and consideration in accordance with Federal cultural resources laws, Executive orders, regulations, and policies and procedures established by the Department of the Interior and the Service. Actions with the potential to affect cultural and historic resources undergo a thorough review before being implemented, as is consistent with the requirements of cultural resource laws. All ground-disturbing projects undergo a review (including, but not limited to, archeological and cultural surveys) under Section 106 of the National Historic Preservation Act.

To comply with the above, the Refuge submits a description of the proposed actions to the Service's Regional Historic Preservation Officer (RHPO). The RHPO helps to identify potentially affected cultural resources. There are no recorded archeological sites within the project area. Pre-restoration surveys have been conducted to confirm this assessment. Additionally, throughout planning and implementation, the Refuge and RHPO coordinates and consults with the State Historic Preservation Office (SHPO) and tribes (e.g., the Confederated Tribes of Siletz Indians, a project partner).

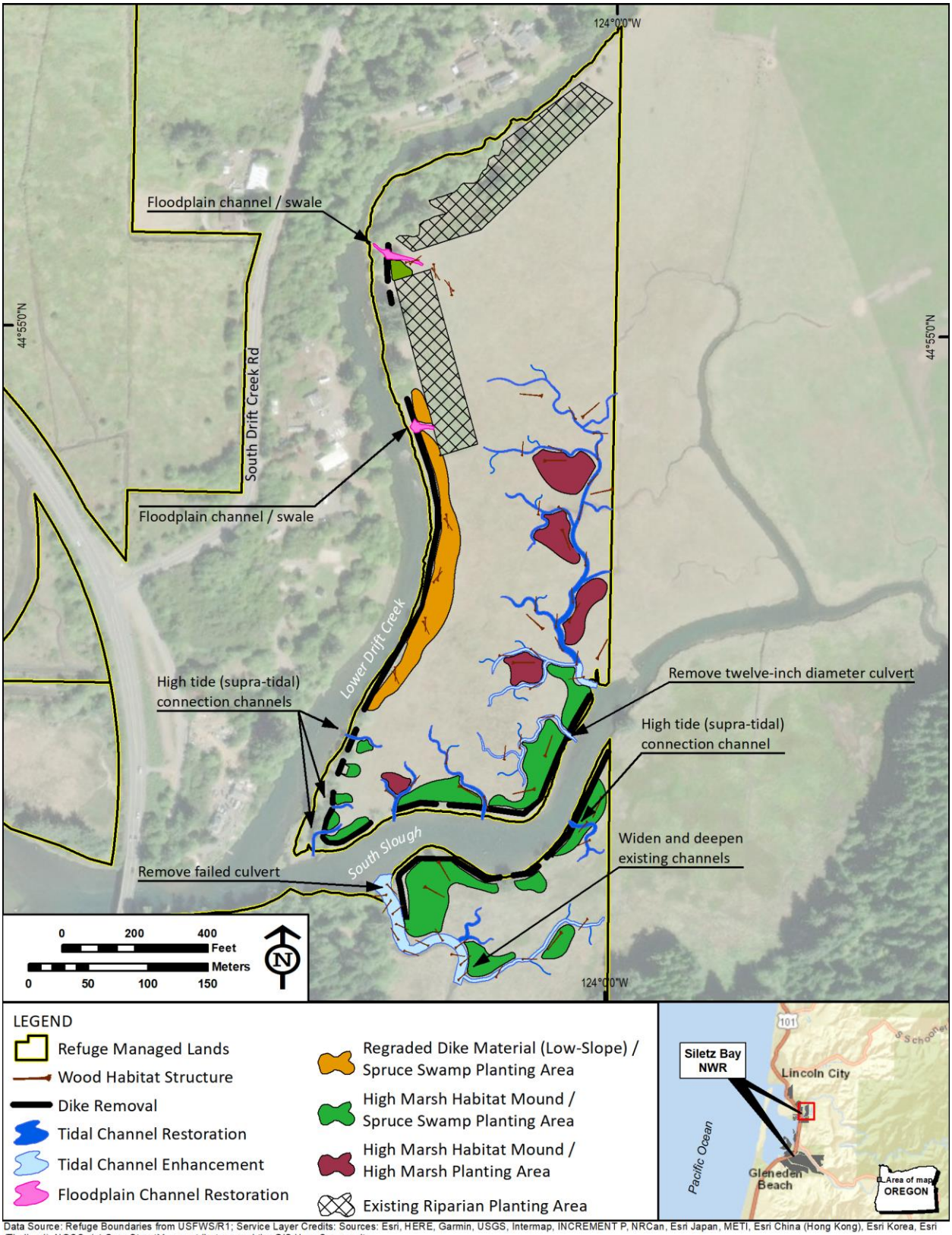
The existence of cultural resources cannot be predicted with certainty. If cultural resources are discovered during implementation of the proposed action, work should cease in the vicinity of the discovery and protocols identified in the "Procedures for Inadvertent Archeological Discoveries for the Oregon Coast National Wildlife Refuge Complex" will be closely followed.

Proposed Actions on the Shaffer Tract under the Preferred Alternative

Dike Removal

Most of the dike surrounding the Shaffer Tract (ranging in height from approximately 10 feet to 13 feet North American Vertical Datum of 1988 [NAVD88], or two to five feet above the marsh surface, and composed primarily of on-site soils) would be removed or lowered, except areas where large established spruce trees are growing (primarily on the western portions along Drift Creek) (Figure 2). These trees would be preserved to provide spruce swamp habitat post-restoration. Approximately 1,400 cubic yards of material would be excavated. Excavated material would be regraded landward in a relatively thin and low-sloped zone in a manner mimicking natural creek sediment deposition. Dike removal would primarily be done at elevations that allow natural hydrologic connectivity with the creeks and sloughs, and that allow spruce and willow plants survival.

Figure 2. Generalized Locations of Proposed Actions on the Shaffer and Watson Tracts (Alt. B)



Data Source: Refuge Boundaries from USFWS/R1; Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community
Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community

Tidal and Floodplain Channel Network Restoration and Enhancement
Restoration on the Shaffer Tract would include tidal channel excavation along historic channel footprints on the interior of the wetland (Figure 2). There would be one, large, primary tidal channel constructed from South Slough at a historic/former channel connection point, and this channel (primarily running north-south) would drive tidal processes across the tract. A twelve-inch diameter culvert connecting a remnant tidal channel to South Slough, along with an aggregate cement slab wedged into the ground in front of the culvert, would be removed.

A series of relatively small floodplain channels and swales would be constructed through the Drift Creek dike (where it would be removed) and between existing large spruce trees and prior riparian revegetation efforts (Figure 2). Existing spruce trees would not be removed or otherwise disturbed so they can provide habitat and serve as a seed source post-restoration. The floodplain channels and swales would be shallow and broad, intended to provide Drift Creek a connection to the floodplain that would inundate annually for several days during high creek flows and/or the highest winter high tides (otherwise known as king tides).

Along the south margin of the Shaffer Tract along Drift Creek, there are several tidal channels that would be inundated with water mainly during high tides (Figure 2; high tide connection channels). Where they connect to Drift Creek, these channels would have bottom elevations at or just below MHHW. These channels would mimic the existing high tide connection channels observed at the south end of Shaffer Tract along South Slough and on the north margin of Drift Creek downstream of Highway 101.

The total length of channels to be restored or enhanced on the Shaffer Tract would be approximately 5,400 linear feet (~4,800 linear feet of tidal channels and >600 linear feet of pilot channels).

High Marsh Habitat Mounds
High marsh habitat mounds that are suitable for spruce trees would be constructed from channel excavation material (Figure 2). These mounds would be designed to mimic natural hummocky topography found in mature forested tidal wetlands. Nurse logs would be partially buried within each mound. These mounds, and associated areas of higher elevations and marsh vegetation, are believed to be a key factor in resilience to rising sea levels, as higher ground and vegetation induces higher rates of sedimentation which, in turn, spur additional vegetation (Kirwan and Megonigal 2013). Starting (current) marsh elevation is generally recognized among the most important factors in marsh progression under rising water levels (i.e., the higher the better) (Thorne et al. 2018).

Proposed Actions on the Watson Tract under the Preferred Alternative

Dike Removal
The Refuge-owned portion of the dike bordering the south bank of South Slough (ranging in height from approximately 10 feet to 12.5 feet NAVD88, or 2 to 4.5 feet above the marsh

surface, and composed primarily of on-site soils) would be removed under the Preferred Alternative (Figure 2). Approximately 900 cubic yards of material would be excavated. The excavated material would be regraded in a manner similar as described above for the Shaffer Tract and used to create high marsh and spruce swamp habitat as previously described.

Tidal Channel Network Restoration and Enhancement
On the Watson Tract, water flowing between South Slough and Watson Creek and the interior wetlands is partially blocked at the channel inlet/outlet. The historic Watson Creek inlet and channel would be restored by removing the failed culvert, tide gate, and accumulated sediment (Figure 2). The channel inlet would be widened and deepened to accommodate more natural flows consistent with its location within the watershed.

Along the north margin of the Watson Tract, there is a tidal channel that would be inundated with water mainly during high tides (Figure 2). The design would be similar to the high tide connection channels described above for the Shaffer Tract.

The total length of channels to be restored or enhanced on the Watson Tract would be approximately 1,200 linear feet (~1,000 linear feet of tidal channels and ~200 linear feet of pilot channels).

High Marsh Habitat Mounds
Similar to the Shaffer Tract, high marsh habitat mounds would be constructed from channel excavation material (Figure 2). These areas would be planted with species characteristic of spruce swamp habitat.

Proposed Actions on the Kangas Tract under the Preferred Alternative

Tidal Channel Network Restoration and Enhancement
The Kangas Tract restoration would include the removal, realignment, or replacement of existing ditches to create a complete dendritic tidal channel system (i.e., primary and secondary channels extending in multiple directions) and would establish site elevations that: (1) allow for a more natural hydrologic regime, (2) restore tidal wetland processes, (3) improve aquatic habitat for multiple species, (4) support spruce swamp vegetation, and (5) increase resilience to SLR (Figure 3). The shape or design of the channels would mimic historic channel parameters, where possible. Some of the existing drainage ditches would be modified or realigned to reduce labor, costs, and negative impacts on the site from heavy equipment. The design would also incorporate pilot tidal channels that would promote future channel network development after restoration. The total length of channels to be restored or enhanced on the Kangas Tract would be approximately 11,200 linear feet (~9,100 linear feet of tidal channels and ~2,100 linear feet of pilot channels).

The restoration design at the Kangas Tract is based on the possibility that the site could be restored to full tidal exchange in the future, meaning the small culvert and berm on private

property downstream (south) of the tract may fail, be removed, or otherwise rendered incapable of restricting tidal flows at some future time. Since this culvert and berm are on private property, its failure, removal, or incapacitation are not reasonably foreseeable and therefore are considered outside of the scope of this EA. However, the Service and partners designed the Kangas Tract restoration around the potential hydrologic conditions under full tidal exchange to prevent an undersized tidal channel network in the event of future restoration.

Ditch Filling

Restoration would also involve filling perimeter ditches on the property boundary and filling specific ditches within the interior of the site (Figure 3). The ditch filling on the perimeter (along the roadways) would create a more gradual slope that would be planted with native plants typically found in spruce swamp habitat. These sloped areas of higher elevation would facilitate a vegetated buffer to protect infrastructure, including the low concrete floodwall separating the tract from the private landowner on the northeast border. These re-contoured, vegetated slopes would also improve water quality entering Siletz Bay by filtering road runoff and help to ensure the tidal flow of water is routed through the restored and enhanced channel system rather than into a roadside ditch around the tract.

The removal (fill) or realignment or replacement of interior ditches would be targeted, with some existing ditches remaining to function as tertiary channels that connect to the newly created or restored tidal channel system. This restoration approach of using some existing features and creating new features, as needed, would save labor and costs while also increasing tidal flows and providing the maximum area of accessible aquatic habitat to juvenile salmonids and other species.

The total length of ditches to be filled on the Kangas Tract is approximately 4,500 linear feet.

Reed Canarygrass Scrapedowns

Based on site surveys and aerial photograph inspections, there is a total of approximately 2.0 acres of monotypic stands of reed canarygrass (RCG) within the Kangas Tract. These patches would be removed down to and including the root masses (18 inches or deeper). After removal, the bare ground would be planted with native vegetation to emulate natural marsh habitat. The excavated grass and root masses would be buried at the bottom of existing ditches that would be filled during the restoration project (e.g., the deep perimeter ditches). These scrapedowns and native plant seeding/planting have been shown to be successful at controlling RCG in tidal freshwater wetlands (Sinks et al. 2021); however, if additional control is needed, the Service would follow up with targeted use of other IPM techniques.

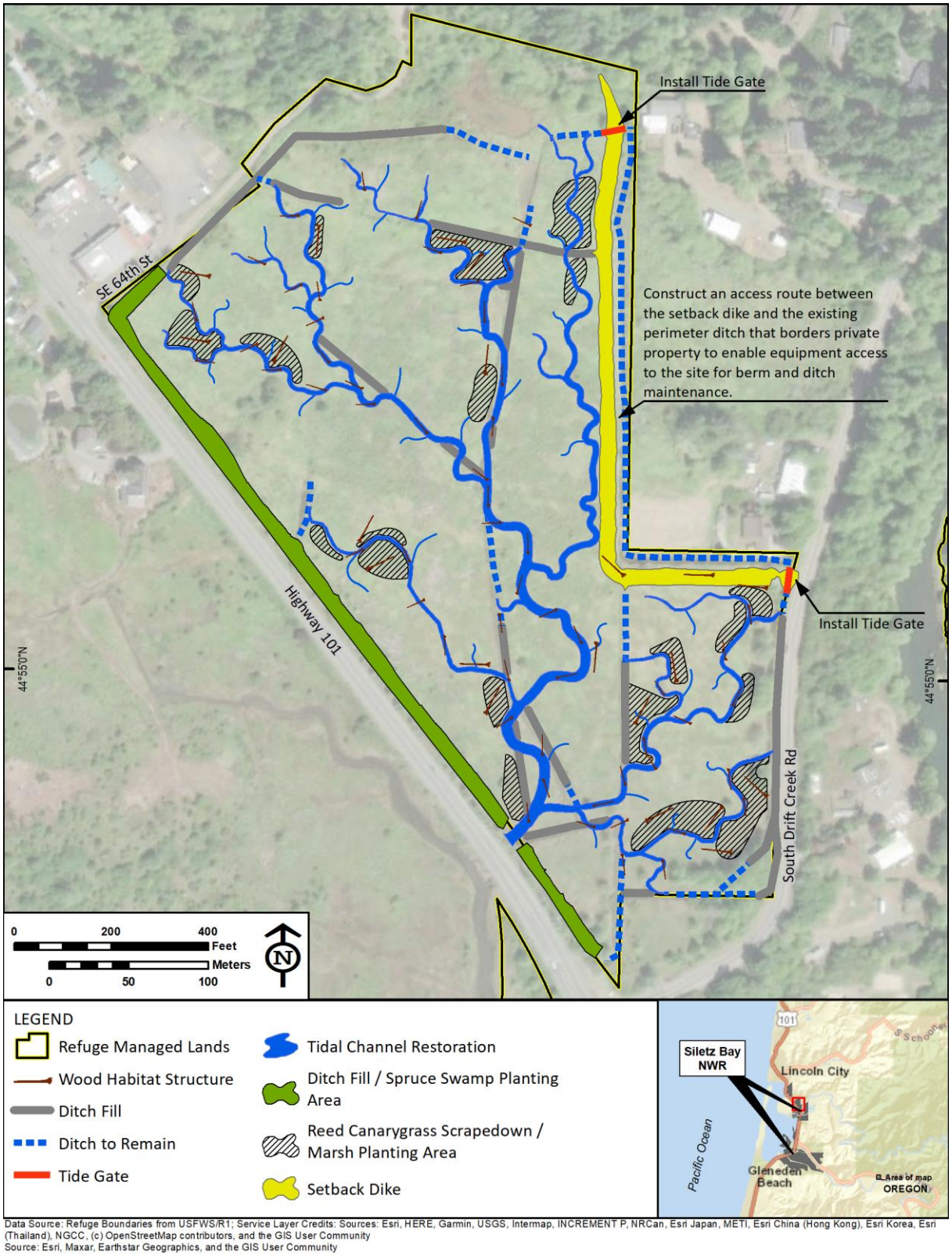
Adjacent Property Protection

Along the northeastern boundary of the Kangas Tract, higher elevation areas adjacent to the existing perimeter ditch would be enhanced to protect private properties to the east from

potential flooding. This “setback dike” would be a continuous feature that would roughly extend 1,400 linear feet from the Refuge uplands on the north portion of the Kangas Tract to the southwestern corner of the private land along South Drift Creek Road. The crest elevation would be at approximately 12 feet NAVD88, which is comparable to the elevation of South Drift Creek Road. A tide-gated culvert would be installed at the north end of the dike to facilitate drainage from adjacent upslope areas and prevent tidal waters from entering onto private lands. If additional private lands between the eastern tract boundary and Drift Creek Road are acquired from willing sellers in the future, the Service may realign the setback dike and extend the tidal channel network onto those lands. An access route would be constructed between the setback dike and the existing perimeter ditch that borders private property to enable equipment access to the site for berm and ditch maintenance. This access route was proposed during the public comment period and Figure 3 has been updated to reflect this addition.

The concrete block wall and adjacent ditch along the private property (tax lot 07-11-35-CA-00400-00) located on the northeast side of the Kangas Tract would remain. The existing dike located south of the block wall would be enhanced and naturalized to mimic a more natural sloping and transitional wetland margin that would be planted with spruce and other vegetation. The enhanced dike would be continuous and connect to the Drift Creek Road embankment on its east side, which requires crossing/filling the ditch that runs along the road. To maintain drainage flow to the south, a culvert would be constructed through the dike. The culvert would have a tide gate on the downstream (south) end of the culvert to prevent tidal waters from entering this drainage region. The western end of the existing dike would tie into the setback dike running north-south along the Refuge’s northeastern boundary. This would create one, continuous dike to protect all private lands east/northeast and contiguous with the Refuge.

Figure 3. Generalized Locations of Proposed Actions on the Kangas Tract (Alt. B)



Alternative(s) Considered, But Dismissed from Further Consideration

Several restoration actions were initially considered by the project team. These alternatives were presented to the public during numerous scoping meetings held in 2021. Based on the feedback the Service received during these public meetings, the following alternative actions were dismissed from further consideration:

Shaffer Tract Setback Dike

A new setback dike along the main north-south oriented property line between the tract and the private ranch to the east could potentially reduce high water impacts to private property if the Drift Creek dike is removed as proposed under Alternative B. This alternative was not considered further since the proposed setback dike would not provide a complete hydrologic barrier; therefore, the private property would flood regardless of the setback dike during certain high tide events. The alternative was also dismissed due to its high cost of construction and negative impacts to wetlands.

Raising Gorton Road

Raising Gorton Road one to two feet and adding drainage culverts through the road was initially considered to improve access for the private residences along the road during high water. However, discussions with the landowners during public scoping meetings in 2021 made it clear that this option would not likely benefit the property owners. The Service learned from the local landowners that such an alternative could impound more water than it would drain because much of the flow and flooding that already occurs on their land comes downstream from Drift Creek. Thus, improvements to Gorton Road were omitted from the alternatives considered.

Logjam Removal in Drift Creek

Conversations with nearby landowners during the October 2021 public scoping meeting and in the fall of 2022 included discussion of a natural logjam in Drift Creek located northeast and approximately 0.8 miles upstream of the Shaffer Tract. The logjam structure appears to be the result of natural bank scour and local tree-fall/log recruitment, racking of upstream logs transported during storms, and dense willow vegetation on the creek banks in this vicinity. Logs and natural debris in streams are recognized as important habitat features for salmonids. Adult and juvenile salmonids use instream structures such as logjams for hydraulic and predator (birds and other fishes) refugia during a range of stream flows. However, this logjam has apparently caused overbank flows from the creek onto the adjacent properties. The landowners requested that the project team investigate the feasibility of removing the logjam to improve flood conveyance in the reach. However, since the logjam is on private property, not within the proposed action area, and outside of the Service's jurisdiction, the alternative to remove the logjam was considered but dismissed.

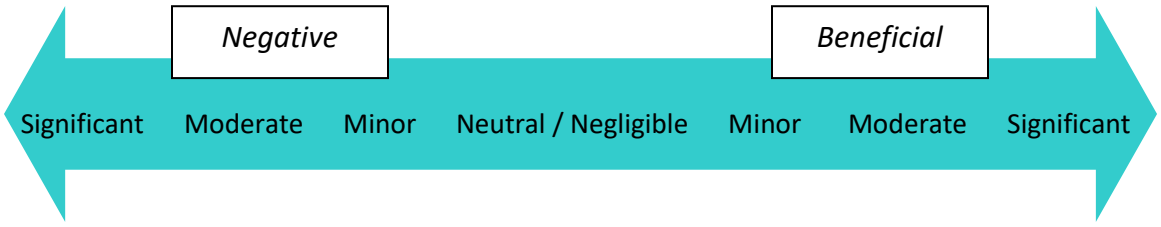
New Kangas Tract Connection Culvert below Drift Creek Road

To improve direct hydrologic connectivity of the Kangas Tract, the installation of a new culvert and channel connection between the tract and Lower Drift Creek was considered. This connection would require a new culvert underneath South Drift Creek Road. The primary benefit of this new tidal channel connection and culvert would be that its hydrologic connection would not be constrained by the existing dilapidated culvert and berm (located downstream on private land) between Kangas Tract and Siletz Bay. However, this option was not explored further due to the anticipated high cost of a new culvert structure.

Affected Environment and Environmental Consequences

This section is organized by affected resource categories and for each affected resource discusses both (1) the existing environmental baseline in the action area for each resource and (2) the effects and impacts of the proposed action and any alternatives on each resource. The effects and impacts of the proposed action considered here are changes to the human environment, whether adverse or beneficial, that are reasonably foreseeable and include direct, indirect, and cumulative effects. Cumulative effects were assessed in context of environmental trends and planned actions relevant to each affected resource.

The qualitative terms moderate, minor, and negligible are used to describe the magnitude of the effect. To interpret these terms, moderate is a higher magnitude than minor, which is of a higher magnitude than negligible. The word neutral is used to describe a negligible or unnoticeable effect compared to the current condition.



The terms identified below are used to describe the scope, scale, and intensity of effects.

- **Neutral/Negligible.** Resources would not be affected, or the effects would be at or near the lowest level of detection. Resource conditions would not change or would be so slight there would not be any measurable or perceptible consequence to a population, wildlife or plant community, recreation opportunity, visitor experience, or cultural resource.
- **Minor.** Effects would be detectable but localized, small, and of little consequence to a population, wildlife or plant community, recreation opportunity, visitor experience, or cultural resource. Mitigation, if needed to offset adverse effects, would be easily implemented and successful.

- **Moderate.** Effects would be readily detectable and localized, with consequences to a population, wildlife or plant community, recreation opportunity, visitor experience, or cultural resource. Mitigation measures would be needed to offset adverse effects, and would be extensive, moderately complicated to implement, and probably successful.
- **Significant (major).** Effects would be obvious and would result in substantial consequences to a population, wildlife or plant community, recreation opportunity, visitor experience, or cultural resource within the local area and region. Extensive mitigating measures may be needed to offset adverse effects and would be large scale in nature, complicated to implement, and may not have a guaranteed probability of success. In some instances, major effects would include the irretrievable loss of the resource.

Direct effects are generally caused by a particular action and occur at the same time and place as the action. Indirect effects are reasonably foreseeable effects caused by the proposed action, but occur later in time, or are geographically separate from where the action takes place.

Time and duration of effects have been defined as follows:

- **Short-term or Temporary.** An effect that generally would last less than one year or season.
- **Long-term.** A change in a resource or its condition that would last longer than a single year or season.

This EA includes the written analyses of the environmental consequences on a resource only when the impacts on that resource could be more than negligible and therefore considered an "affected resource." Any resources that will not be more than negligibly impacted by the action have been dismissed from further analyses.

The following resources either (1) do not exist within the project area or (2) would either not be affected or only negligibly affected by the proposed action:

- Wilderness or other special designation

For more information on the environmental consequences of Alternative A, Current Management, refer to the environmental consequences of Alternative C in the Environmental Assessment associated with the CCP (USFWS 2012; available at https://ecos.fws.gov/ServCat/Reference/Profile/117539) and summarized in the FONSI associated with the CCP (USFWS 2013; available at https://ecos.fws.gov/ServCat/Reference/Profile/43347). The environmental consequences analysis of Alternative C in that document is incorporated by reference here for Alternative A, Current Management.

Natural Resources

Geology and Soils

Description of Affected Environment for the Affected Resource

Before its agricultural conversion, the project area was shaped by periodic earthquakes and tsunamis within the Cascadian subduction zone, melting glaciers at the end of the most recent ice age, and the daily tidal processes. Considered a "drowned river" estuary, the Siletz Bay estuary formed when melting glaciers at the end of the most recent ice age caused global and regional SLR. The remnant river mouth was then submerged and over time infilled with sediment. Infilling of the estuary and marsh development occurs as runoff from precipitation washes sediments from slopes into streams or their floodplains. These sediments are then transported downstream to the estuary where they settle and become influenced by tides (Simenstad 1983). Most of the present-day Refuge is located on this floodplain alluvium, which is predominantly composed of mixtures of sand, silt, clay, and organic matter (Schlicker et al. 1973, Snavely et al. 1976). Much of the coarser sediment settles out near the banks of the river, forming natural levees. The finer materials such as fine sands and clayey silts remain suspended longer and settle throughout the intertidal zone and flooded lowlands. Additionally, sediments are moved into the lower estuary from the ocean shore by tsunamis, storm surges, and dune building. Over time, accretion of fine sediments resulted in the formation of a classic tidal mudflat and marsh system.

The Natural Resources Conservation Service maps two soil types across the project area: Coquille silt loam, 0 to 1 percent slopes and Coquille silt loam, 0 to 1 percent slopes, protected. The Shaffer Tract and low-lying areas of the Watson Tract are mapped as Coquille silt loam, 0 to 1 percent slopes, which is a soil of tidal marshes and estuaries, derived from estuarine deposits. It is very poorly drained and subject to frequent flooding and ponding. It is a hydric soil and not considered prime farmland soil. The Kangas Tract is mapped as Coquille silt loam, 0 to 1 percent slopes, protected, which is a soil of floodplains. It is a very poorly drained, hydric soil derived from recent silty alluvium from mixed sources. Due to it being behind a dike, it is rarely subject to flooding, but ponds frequently. It is a farmland soil of statewide importance (USDA 1997).

The project area is historic tidal wetland, separated from daily tidal action by dike construction, and drained for agricultural purposes between the late 19th and mid-20th century. Although there is muted tidal influence (i.e., reduced tidal range, inundation frequency, and exchange due to the presence of an undersized culvert southwest of the Kangas Tract) in limited areas due to dike breaches, most of the project area has soil characteristics typical of pasture and degraded wetlands that have not experienced daily tidal flood events for an extended (>50 year) period.

Diking of tidal wetlands for prolonged periods for agricultural or other uses often leads to changes in sediment accretion, soil organic content, soil density, and marsh surface elevation loss (subsidence). Dikes are a barrier to tidal inundation and suspended sediment movement.

This reduces the amount of flood delivery of inorganic sediment and lowers sediment accretion rates (e.g., Thom 1992). Additionally, drainage of a wetland can lead to greater oxidation of soil organic matter and soil compaction (Drexler et al. 2009), both of which contribute to elevation loss. These factors are compounded by the historic use of heavy farm machinery and livestock grazing. Elevation loss of up to one meter has been documented in various diked and newly restored tidal wetlands in the Pacific Northwest, although the extent of impacts may vary by geographic location and how long the wetland was diked (Frenkel and Morlan 1991, Brophy 2009, Brophy et al. 2017, Clifton et al. 2018, Poppe and Rybczyk 2021, Janousek et al. 2022).

Description of Environmental Trends and Planned Actions

Many soil properties would be affected by the changes in temperature, precipitation regime, extreme events, and SLR associated with climate change. For example, increases in temperature may contribute to increasing the rates of soil biogeochemical property changes (e.g., organic matter decomposition, denitrification, methanogenesis). There is high uncertainty with downscaled predictions of precipitation change (see literature reviewed in USFWS 2013); however, changes in precipitation regime and extreme weather events may affect water table level and the frequency and duration of saturated soils, which would affect biogeochemical processes (Trettin et al. 2019). Changes in flooding and salinity due to SLR will affect soil carbon and nutrient cycling, although whether these conditions would stimulate or inhibit the biochemical processes is highly dependent upon local conditions. Climate change may also have indirect impacts to soil processes through changing plant community composition (Janousek et al. 2017).

No known planned actions by nearby municipalities, state government, tribal government, other federal agencies, or other parties are likely to cause significant adverse effects to geologic or soil physical characteristics relevant to the proposed Drift Creek Unit habitat restoration project area.

Impacts on Affected Resource

Alternative A (Current Management):

The continued, long-term degradation of tidal wetland soils would be expected under current management, the no-action alternative. The presence of dikes, restrictive culverts, and/or simplified low-order channel networks with little branching would prevent or limit regular tidal inundation, lowering the amount of sediment delivery and accretion within the project area. These factors, along with the draining of organic soils and soil compaction, would contribute to subsidence. With reduced potential for sediment accretion, the project area would be less ecologically resilient to rising sea levels.

Alternative B (Preferred Alternative):

Under the preferred alternative, there would be long-term minor to moderate beneficial effects of restoring the natural processes of tidal inundation and sediment deposition to the proposed project area. Dike removal and the restoration and enhancement of tidal and floodplain

channels would allow for improved conveyance of sediment. The likelihood of increased inundation through daily tides and seasonal flooding and the associated increase in tidal sediment deposition would cause an eventual rise in land elevation and return to anoxic (i.e., oxygen-poor) wetland soil conditions, which would promote the formation of productive wetlands and mudflats. Native tidal wetland vegetation is adapted to natural flooding and salinity regimes and following restoration, grows quickly and senesces (i.e., dies back) annually, adding large quantities of organic material to the marsh surface and below the surface via roots and rhizomes. Carbon accumulated in these soils is held there for centuries unless disturbed (i.e., carbon sequestration and storage), helping to mitigate anthropogenic climate change. Additionally, by improving hydrologic connectivity, sediment transport, and floodplain deposition processes, the preferred alternative would increase resilience of the project area to SLR.

Adverse impacts to geology and soils under Alternative B would be direct and indirect, short-term, of minor to moderate effect, and localized to the project area. These impacts stem from the use of heavy machinery and construction equipment and may include soil compaction, temporary grading, short-term downstream sediment deposition, and increased soil erosion and runoff in the immediate area of construction operations. Specific construction impacts such as compaction and erosion would be temporary and would be mitigated by utilizing BMPs such as low ground pressure equipment and wood mats for tracked equipment to reduce rutting and compaction. Exposed soils could erode at higher rates than under current conditions. Following construction, the project area would be re-seeded with native plant species to prevent erosion. Because of this and because the site is relatively flat, surface runoff after restoration would be low energy, and onsite erosion would be minimal.

Habitat and Vegetation

Description of Affected Environment for the Affected Resource

Historically, habitats within the project area included emergent tidal marshes, scrub-shrub tidal swamps, and forested tidal swamps. Currently, the project area is characterized as diked former tidal wetland habitat affected by varying stages of muted tidal action. Consequently, vegetation communities within the project area are characteristic of muted tidal wetlands that receive restricted tidal influence (Brophy 2001, 2002). Vegetation patterns follow remnant tidal channels, where they persist, ditches (Kangas Tract), and the general topography of the tracts.

In the current state of muted tidal flow, the Shaffer Tract is predominantly occupied by Pacific silverweed-creeping bentgrass-Baltic rush communities, with some Lyngbye's sedge communities where tidal influence is strongest, and creeping spikerush in low areas. Some Sitka spruce trees grow on portions of the dike. Priority invasive plant species treated with herbicide and/or mechanically removed within the tract include Japanese knotweed, Himalayan blackberry, tansy ragwort, English holly, English ivy, and various non-native thistle species.

Starting in 2019, portions of the Shaffer Tract were fenced and planted to facilitate riparian habitat restoration. Species planted in the western planting area included canopy-forming trees and understory (western redcedar, Sitka spruce, western hemlock, and salmonberry), drier soil species (red alder and red elderberry), wetter soil species (cascara, vine maple, and crabapple), and flood-tolerant species (twinberry, willow, and red-osier dogwood). Based on monitoring results, some species were replaced due to low survival rate or high stress. In 2020, native grass seed (meadow barley, tufted hairgrass, and shortawn foxtail) was sown within the northern riparian planting area following blackberry control. Species planted in the northern planting area included Sitka spruce, red alder, bigleaf maple, vine maple, cascara, salmonberry, twinberry, Pacific ninebark, red-flowering currant, Nootka rose, red elderberry, thimbleberry, Douglas spiraea, crabapple, sword fern, slough sedge, Pacific wax myrtle, Hooker willow, and dogwood.

On the Watson Tract, tidal influence is stronger in the north two-thirds of the site, where brackish-tolerant species are dominant. These include creeping bentgrass communities and Lyngbye's sedge communities. The southernmost section of the Watson Tract was historic tidal spruce swamp; however, beaver dams likely allowed freshwater wetland plants (e.g., slough sedge) to mingle with brackish-tolerant species (e.g., Lyngbye's sedge).

The Kangas Tract is primarily a freshwater wetland, occupied by reed canarygrass, slough sedge, Pacific silverweed, and soft rush communities.

Description of Environmental Trends and Planned Actions

Development and Land Use Change:

Since the beginning of European-American settlement in the Pacific Northwest, most estuaries have been substantially altered. Over half of all historical tidal wetlands once present along the Oregon coast have been lost due to land conversion, with tidal scrub-shrub and forested wetlands (i.e., tidal swamp) particularly heavily impacted by logging and land conversion (>95% loss) (Brophy 2019). As coastal communities grew over the 19th and 20th centuries, many tidal wetlands in the region were converted to agricultural uses, particularly in the lower reaches of estuaries where the broad, flat plains occupied by tidal wetlands were viewed as favorable areas for raising livestock or growing crops. While land conversion was profitable for agricultural enterprises, the substantial loss of tidal wetlands diminished the capacity of these ecosystems to provide other functions and services for the Oregon coast including fisheries support and climate change resilience. As noted in the Project Area Overview, Siletz Bay lost large amounts of historic tidal wetlands to either diking or conversion to another vegetation class. However, Refuge tidal wetland restoration projects in 2000 and 2003 restored 86 acres at Millport Slough and in 2016, brackish waters were allowed to flow through and around Alder Island to enhance wetland functions.

Sea Level Rise:
Tidal wetlands exist just at and above sea level and can adapt to slow sea level changes. However, if sea level rises too fast, tidal wetlands may not be able to persist in their current locations. SLR has two main effects on tidal wetlands. On the upslope edge, wetland plant communities may move to areas of higher elevations as areas become increasingly inundated. These higher areas are called "landward migration zones". On the downslope side, tidal wetlands may convert to mudflats or other non-vegetated habitats once inundation becomes too frequent and too deep for vegetation to survive. These actions combine for an upslope migration of tidal wetlands.

Using a model that incorporates site-specific data on wetland elevation, tidal inundation, accretion rates, and soil characteristics, Thorne et al. (2018) projected changes in the composition of tidal wetland habitats in Siletz Bay based on SLR scenarios (high = 4.65 feet, moderate = 2.07 feet, and low = 0.39 feet) projected through 2110. Under the moderate SLR scenario by 2050, the composition of tidal wetland habitats in Siletz Bay are relatively stable. Under the high SLR scenario by 2050, there would be a gradual loss of high marsh habitats with an expansion of middle and low marsh habitats. Under moderate SLR scenarios by 2110, there would be a loss of high marsh habitats and conversion to middle marsh, low marsh, and intertidal mudflat. Under high SLR scenarios by 2110, there would be a complete loss of high, middle, and low marsh habitat, leaving intertidal mudflat. Although Siletz Bay wetlands have large elevation capital relative to MHHW (i.e., more higher elevation wetlands), low measured accretion rates mean that these wetlands are still vulnerable to SLR. Siletz Bay has a relatively low potential for landward migration due to a narrow riverine valley with steep topography that limits upslope movement.

Impacts on Affected Resource

Alternative A (Current Management):
Under the no-action alternative, in the short- to medium-term, the Drift Creek Unit would remain as muted tidal wetlands that receive limited tidal influence within portions of the tracts. The existing habitat and vegetation would remain essentially unchanged except in areas of continued restoration of native vegetation (e.g., re-establishment of riparian habitat on the Shaffer Tract), which would provide some minor benefits to habitat and vegetation. Eventually, SLR, the continued activities of beavers and/or nutria to hasten the deterioration of dikes on the Shaffer and Watson Tracts by excavating tunnels, and the reduced rate of tidal sediment accretion would lead to increased frequency, duration, and magnitude of tidal inundation in the project area. These changes would lead to gradual conversions or loss of vegetated wetland habitats.

Alternative B (Preferred Alternative):
The preferred alternative would provide long-term minor to moderate benefits to habitats and vegetation by restoring about 74 acres of historic tidal wetland on the Shaffer, Watson, and Kangas Tracts. This action would involve management of vegetation communities with the goal

of restoring a diversity of native species, establishment of riparian forest, and limiting invasive plant species. A specific focus of the restoration design is to compensate for the historic loss of tidal scrub-shrub and spruce swamp habitat. Throughout the unit, approximately 1 acre of high marsh and 4.3 acres of tidal swamp habitat would be created by placing materials from dike lowering and tidal channel excavation to create an ecotone slope (i.e., transition zone between ecological communities along a gradient) of elevations from high marsh vegetation to elevations suitable for shrub-scrub and spruce swamp habitat, while minimizing the growth of reed canarygrass. In addition to re-creating two habitat types nearly gone from the Siletz Bay estuary, placement of excavated material on site in this manner allows cut and fill to be balanced, eliminating the need to off-haul excavated materials.

The project area is vulnerable to conversions or loss of vegetated wetland habitats due to SLR. Sediment transport from Drift Creek and subsequent accretion on Shaffer and Watson tracts has the potential to slow or prevent this habitat loss if the rate of accretion exceeds SLR. This project has the potential to increase accretion by the removal of dikes bordering the east side of Drift Creek and along South Slough. These dikes currently reduce sheet flow and associated Drift Creek sediment load from reaching the marsh surfaces during minor and moderate storm events. Additionally, high marsh habitat mounds would mimic natural hummocky topography found in mature forested tidal wetlands. These mounds and associated areas of higher elevations are believed to promote resilience to rising sea levels as they promote higher rates of sedimentation.

During the construction, including dike removal and tidal channel excavation, some localized vegetation and habitat would be temporarily impacted through the earth moving activities. This removal and destruction of habitat would be minimized using BMPs. Since the overall goals of the proposed actions would be to restore historic tidal wetland habitat, the most frequently adversely impacted plants would not be native to the site or would be invasive species. Desirable species such as Sitka spruce would be retained, and areas disturbed by project activities would be seeded or planted with native species.

The presence of machinery and additional people during the construction process could create additional invasive species spread. However, invasive species spread would be mitigated by implementing BMPs, such as washing and cleaning all equipment prior to mobilization; removing nonnative materials encountered during excavation; replanting with weed-free native grasses, trees, and shrubs; and other practices, as appropriate and practicable, described in the Region 1 Practices to Minimize the Introduction of Invasive Species by Service Activities (USFWS 2017).

As noted above, the preferred alternative is expected provide long-term minor to moderate benefits to habitats and vegetation by restoring about 74 acres of historic tidal wetland. Although restoration of 74 acres of historic tidal wetlands expected to mainly result in beneficial effects, in light of the substantial loss of tidal wetlands in the Siletz Bay area,

restoring 74 acres (approximately 7%) of historic tidal habitat does not represent a significant beneficial effect.

Terrestrial Wildlife and Aquatic Species

Description of Affected Environment for the Affected Resource

Eighty-eight avian species were seen or heard on the Drift Creek Unit during Refuge surveys conducted from March 2021 through March 2022. The unit provides habitat for migratory waterfowl and shorebirds, which in turn provide an important prey base for the delisted bald eagle and the peregrine falcon. Both birds breed locally and are found year-round in the area. Waterfowl species such as western Canada goose, mallard, bufflehead, American wigeon, common merganser, gadwall, northern pintail, and hooded merganser feed and rest on the marshes. Great blue heron and other waders; gulls; shorebirds, including sandpipers, dunlin, and dowitchers; and open meadow species such as sparrows and swallows are seen here. Marshes at the mouth of Drift Creek are used by band-tailed pigeons for obtaining minerals. Raptors, such as northern harrier and red-tailed hawk, are commonly seen foraging the marshes for prey. The forested areas are also home to typical forest passerine species in addition to those birds dependent on water edges, such as great blue herons, belted kingfisher, wood duck, and Pacific wren.

The wetlands and riverine systems support anadromous fish including spring and fall Chinook, threatened coho salmon (Oregon Coast ESU), chum salmon, winter and summer steelhead, coastal cutthroat trout, and Pacific lamprey (USFWS 2004, van de Wetering, personal communication). Common marine fish species using estuaries include Pacific staghorn and buffalo sculpin, shiner perch, and English sole (USFWS 2006). The intertidal mudflats and channel bottoms support numerous invertebrate species including clams, shrimp, and crabs.

Black-tailed deer and Roosevelt elk use the evaporated salt accumulations within the marsh habitats as “licks” and graze the marsh grasses (USFWS 2004). The forested wetland and woody riparian habitat support deer and elk and small mammals, such as beaver, mink, river otter, muskrat, raccoon, deer mice, and a variety of species of voles, moles, and shrews. Many amphibians and reptiles, such as long-toed and western red-backed salamanders, rough-skinned newts, Pacific tree and red-legged frogs, northern alligator lizards, and garter snakes, are also dependent upon these habitats.

Description of Environmental Trends and Planned Actions

The same environmental trends that affect habitats (development and land use; climate change; and SLR) also directly and indirectly adversely affect wildlife on the Refuge.

Impacts on Affected Resource

Alternative A (Current Management):

Under the no-action alternative, the muted tidal wetlands would continue to provide habitat for various types of wildlife, but the quality of habitat would continue to be limited for priority

resources of concern such as salmonids. Waterfowl would continue to use the limited wetland habitat on the Drift Creek Unit seasonally. This habitat occurs primarily during the wet winter season in flooded portions of the degraded wetlands or in the limited open water after substantial rainfall. Habitat for shorebirds and wading birds would exist only along the narrow margins on the outside of the dikes and along some of the drainage channels. However, the continued restoration and/or maintenance of native vegetation (e.g., re-establishment of riparian habitat on the Shaffer Tract) and control on invasive plant species would provide some minor benefits to native bird species, amphibians, mammals, and invertebrates.

Alternative B (Preferred Alternative):
The high productivity of tidal wetlands is essential for providing food chain support and fish and wildlife habitat. Restoration of natural hydrology would aid in the development of vegetated communities that provide vital rearing, feeding, and refuge habitat for fish and benthic communities and wildlife species. Dike removal; tidal and floodplain channel network restoration and enhancement; control of invasive plant species; and planting and seeding to restore native marsh, shrub swamp, spruce swamp, and riparian vegetation under the preferred alternative would create functional tidal wetlands that would improve the quantity and quality of foraging habitat available for raptors, waterfowl, shorebirds, and wading birds. These areas, subject to the regular ebb and flood of the tide, would become colonized by clams, mussels, shrimp, small invertebrates, and other forage items upon which many species of birds and mammals rely. The improved tidal channels and marsh wetlands would provide perching and shelter areas above typical high tide levels and offer cover to small birds and mammals along with foraging habitat for egrets, herons, ducks, and other species.

Tidal wetlands provide a variety of functions that are vital to several species and life history types of anadromous salmon stocks, particularly during the juvenile outmigration (e.g., Healey 1982, Simenstad et al. 1982, Groot and Margolis 1991). The deeply incised tidal channels offer productive foraging habitat and refugia from predators (e.g., Simenstad et al. 1982, Cortright et al. 1987, Schreffler et al. 1990, Schreffler et al. 1992). Large wood increases habitat complexity, provides refugia from high summer water temperatures, supports macroinvertebrate communities, and provides cover from predators. Also, the mixing of salt water from the ocean and fresh water from the streams and rivers provides outmigrating juvenile salmon the opportunity for gradual osmotic acclimation (Simenstad et al. 1982, Iwata and Komatsu 1984). Together, these factors enhance growth, which contributes to the survival and fitness of juvenile salmon throughout their life history (Reimers 1973, Lebovitz 1992). By increasing tidal flow and function over 74 acres of tidal wetland habitat, increasing habitat complexity, removing channel obstructions, establishing native vegetation, and restoring functions including fish habitat connectivity and large wood dynamics, the preferred alternative would lead to long-term moderate benefits to salmonids, visiting marine fish, and resident fish.

There would be short-term, temporary (4–6 weeks) adverse impacts to wildlife during the construction phase of the restoration. Construction would occur during the drier season in early August through mid-September. This timing avoids the breeding season for most birds and mammals and would be prior to adult anadromous fish entering Drift Creek to spawn. The presence of large machinery and people have the potential to disturb wildlife populations and impact wildlife in the short term. This temporary disturbance would likely affect behavior of marsh dwelling species such as waterfowl and aquatic species. Direct, short-term, localized, minor impacts would be expected on benthic fauna and infauna smothered by sediment placement. Short-term, direct, adverse impacts to fish would be minimized by fish removal procedures and the use of BMPs to control erosion and sediment from entering the waterways. Measures to reduce sedimentation and contamination would minimize indirect effects associated with degraded water quality. All adverse impacts to wildlife from the restoration work would be temporary, minimized through use of BMPs (e.g., fish entrapment prevention, sediment exclusion), and would have a minor impact.

Threatened and Endangered Species, and Other Special Status Species

Description of Affected Environment for the Affected Resource

Critical habitat was designated for the Oregon Coast coho salmon ESU at the time they were federally listed as a threatened species (73 FR [Federal Register] 7816). The definition of critical habitat is that area necessary for the survival and persistence of a species. Critical habitat is categorized by primary constituent elements (PCE) that describe the habitats or biological features required by the species. The PCEs for coho salmon include freshwater spawning sites, freshwater rearing sites, freshwater migration corridors, estuarine areas, and nearshore marine habitats (73 FR 7816). The Siletz River and its tributaries are considered critical habitat; the PCEs within the Siletz system are freshwater rearing areas, freshwater migration corridors, and estuarine areas. Most of the aquatic habitat within Siletz Bay NWR or the lower Siletz River is considered estuarine habitat. The important elements within an estuary for rearing salmonids are salinity and water quality conditions that support both adult and juvenile life stages. These habitats support juvenile coho and Chinook salmon as they undergo the physiological transformation that allows them to survive in salt water.

Salmonids use the Siletz River, Millport Slough, Drift Creek, and other small tributary streams or side-channels throughout the Refuge. These riverine areas are highly important and provide food and nursery areas for young fish. Juveniles and smolts can also be found throughout tidal marsh habitats where they use slough and channel areas.

Juvenile salmonid use of the project area, specifically the Kangas Tract, has been documented by the Service and Confederated Tribe of Siletz Indians (CTSI) for over 20 years. In this estuary and others nearby, data shows that age 0 coho find these slow or no velocity areas in certain times of year, even when there is limited tidal exchange. They persist in these areas until the following spring. These same fish groups are not often seen in open estuary or in larger tidal

channels with full exchange. Starting in early November, arrival of young coho from upper watershed streams begins, and they remain in these areas until May the following year (van de Wetering, personal communication).

Threatened eulachon and green sturgeon are known to occur in the Siletz River surrounding the Refuge. The approved boundary of Siletz Bay NWR is within the historic range of threatened Pacific marten (Coastal Distinct Population Segment), threatened marbled murrelet, threatened northern spotted owl, threatened western snowy plover, endangered leatherback sea turtle, endangered loggerhead sea turtle, and threatened olive ridley sea turtle. However, there are no known occurrences of these species within Refuge-managed lands, including the project area.

Description of Environmental Trends and Planned Actions

The same environmental trends that affect other wildlife species and habitats (development and land use; climate change; and SLR) would also directly and indirectly adversely affect threatened and endangered species on the Refuge.

Impacts on Affected Resource

Alternative A (Current Management):

Under the no-action alternative, adult salmonids, eulachon, or green sturgeon would continue to spawn above the project area in the river and tributaries. Juvenile fish would continue to use the limited available habitat in the ditches and remnant channels in the Drift Creek Unit. The suitability of these rearing habitats would remain sub-optimal.

Alternative B (Preferred Alternative):

Estuarine rearing habitat for coho and other salmonids has experienced severe declines relative to historic levels in the Siletz Basin (Brophy 2019). Additionally, models predict that the Siletz Bay would experience substantial conversion or loss of productive high and middle marsh habitats to less productive habitats under both moderate and high SLR scenarios in the 2050 to 2110 horizon (Thorne et al. 2018). The loss of access to tidal wetlands and their channels has been recognized as a contributor to the decline of coho and estuary restoration is one of the necessary actions listed in NOAA's 2016 Oregon Coast Coho Recovery Plan (NMFS 2016) as well as in Oregon's Conservation Strategy (ODFW 2016) and in the Oregon Coast Coho Conservation Plan (ODFW 2007). The preferred alternative would increase the availability, amount, and quality of rearing habitat for coho and other native aquatic species populations, including eulachon and green sturgeon. By increasing tidal inundation, increasing habitat complexity, removing channel obstructions, establishing native vegetation, and restoring functions including fish habitat connectivity and large wood dynamics, the preferred alternative would lead to long-term benefits to threatened and endangered fish.

The same short-term temporary, adverse impacts resulting from the construction phase of the restoration, as described in the wildlife impacts section above, would also impact threatened and endangered species. Incidental take of listed fish species would be minimized through

BMPs such as fish exclusion barriers. During fill or dewatering of existing ditches and other water features, best practices and permit requirements for de-fishing (i.e., fish salvage) would be followed.

Incidental take of individual fish (e.g., juvenile coho) that may occur would be offset by the sheer number of fish produced in the Siletz Basin in most years and the anticipated increase in production as a result of the restoration. Thus, the loss of a small number of fish would be considered a less-than-significant adverse effect of the preferred alternative because while the effects would be readily detectable and localized with measurable consequences to listed fish species, the effects would not be detectable or measurable beyond the immediate area of impact.

Restoration activities would alter designated coho salmon critical habitat by affecting freshwater rearing areas, freshwater migration corridors, and estuarine area PCEs. Long-term effects would be beneficial because all PCEs would be enhanced by the restoration activities. Short-term adverse effects may occur during the restoration, as discussed above. Because of the overall net beneficial impacts, the preferred alternative would result in no adverse modification to designated critical habitat. While the preferred alternative would increase and enhance critical habitat, this increase is not considered significant in the context of ongoing and historic degradation of salmon habitat within the Siletz River watershed and on the Oregon coast.

To summarize, in the context of the relatively small size (7% of historic estuary habitat) of the restoration project, the preferred alternative is anticipated to have a less-than-significant, short-term adverse impact on listed fish species during construction and a less-than-significant long-term beneficial effects on listed species as a result of the restoration.

Hydrology and Floodplains

Description of Affected Environment for the Affected Resource

Tidal Hydrology:

Hydrology on all tracts is strongly or at least moderately influenced by tidal fluctuations that regulate water levels in Siletz Bay, Drift Creek, and South Slough. As is typical on the Pacific coastline, tides in Siletz Bay are mixed semidiurnal, meaning that two low tides and two high tides occur per day at different elevations. Tidal datums relevant at the project site are shown in Table 1.

TABLE 1. LOWER DRIFT CREEK TIDAL DATUMS, IN FEET (NAVD88)

Water Level / Tidal Datum	South Beach, Newport (Reference – NOAA station 9435380)	Salishan Boat Launch (Siletz Bay)	Drift Creek (Upstream of Highway 101)
FEMA base flood elevation		14.0	14.6
Highest observed tide	11.66	11.5	
Representative king tide		10.7	
Mean higher high water (MHHW)	7.57	7.3	6.8
Mean high water (MHW)	6.87	6.6	6.2
Mean tide level (MTL)	3.74	4.9	4.9
Mean low water (MLW)	0.61	3.0	4.1
Mean lower low water (MLLW)	-0.77	2.5	4.0
NAVD88 Datum	0.00	0.0	0.0

The calculated datums showed that MHHW and mean high water (MHW) water were very similar to those predicted at the South Beach station but mean low water (MLW) and mean lower low water (MLLW) were significantly (two to four feet) higher. The truncated tidal range is likely due to fluvial inputs from the Siletz River (Salishan boat launch) or Drift Creek. Datums for Kangas Tract were not calculated because water levels collected at the Highway 101 culvert are heavily influenced (muted and truncated) by the dilapidated and undersized culvert and private road berm located between Siletz Bay and the tract. Thus, the tidal exchange at this location is extremely stunted, approximately only one to two feet in magnitude. This barrier causes the Kangas Tract to function as a wetland with a relatively stable water surface elevation, except when affected by high precipitation events and hillslope drainage which impounds behind Highway 101. For design, planting plan, and other restoration purposes, the datums at Salishan are most relevant to the Kangas Tract, while the Drift Creek datums are most relevant to Shaffer and Watson Tracts (W2r 2022).

Fluvial Hydrology:
The lower Drift Creek watershed has a contributing watershed area of 42 square miles. The watershed area begins in the central Oregon coast range and flows west through the Siuslaw National Forest to the Siletz Bay south of Lincoln City. Mean annual precipitation is 113 inches, with a 2-year, 24-hour precipitation total of 4.5 inches. Although the Drift Creek is ungauged, there are two adjacent reference creeks with U.S. Geological Survey (USGS) gauges located on the Siletz River (14211550) and Schooner Creek (14303950).

Peak flow hydrology for Lower Drift Creek was developed using USGS StreamStats (2021) and scaled flow data from the Siletz River and Schooner Creek. Peak flows for the Siletz River were estimated from standard flow frequency analysis with the Siletz River at Siletz stream gauge

data. These peak flow estimates, along with USGS peak flow statistics for Schooner Creek (near Lincoln City) were scaled by drainage basin area. Table 2 compares the scaled peak flows with the Drift Creek USGS StreamStats data, and the average for all three peak flow estimates. The StreamStats peak flow data was nearest to the average and was used as the peak flows for the hydraulic analysis supporting the effects analysis.

TABLE 2. PEAK FLOW HYDROLOGY FOR DRIFT CREEK, IN CUBIC FEET PER SECOND (CFS)

Flow Recurrence Interval	Annual Chance Exceedance	Drift Creek (Using USGS StreamStats)	Drift Creek (Using Siletz River Flow Scaled to Basin Area)	Drift Creek (Using Schooner Creek Flow Scaled to Basin Area)	Average of Peak Flows
2-year	0.5	3,590	4,053	3,000	3,548
5-year	0.2	4,960	5,385	4,336	4,894
10-year	0.1	5,860	6,169	5,227	5,752
25-year	0.04	7,030	7,067	6,445	6,848
50-year	0.02	7,900	7,676	7,396	7,657
100-year	0.01	8,780	8,244	8,346	8,457
500-year	0.002	10,800	9,438	10,693	10,310

Channel Conditions:
On the Shaffer Tract, tidal circulation enters from South Slough and the deterioration of an earthen dam between 1993–1996 now allows for limited tidal flow. Remnant tidal channels draining into South Slough form a low-order system with little branching. Levee scour on the east bank of Drift Creek on the northwest portion of the tract now causes increased inundation.

Tidal flow enters the Watson Tract both from a partially blocked channel connecting to South Slough with a dilapidated culvert at the northwest corner of the tract, and through some small breaches in the dike along the north edge of the site. Some remnant tidal channels exist within this tract but, due to truncated tidal exchange and lack of flushing, have become silted over time. This tract is known to have beaver activity which impounds freshwater.

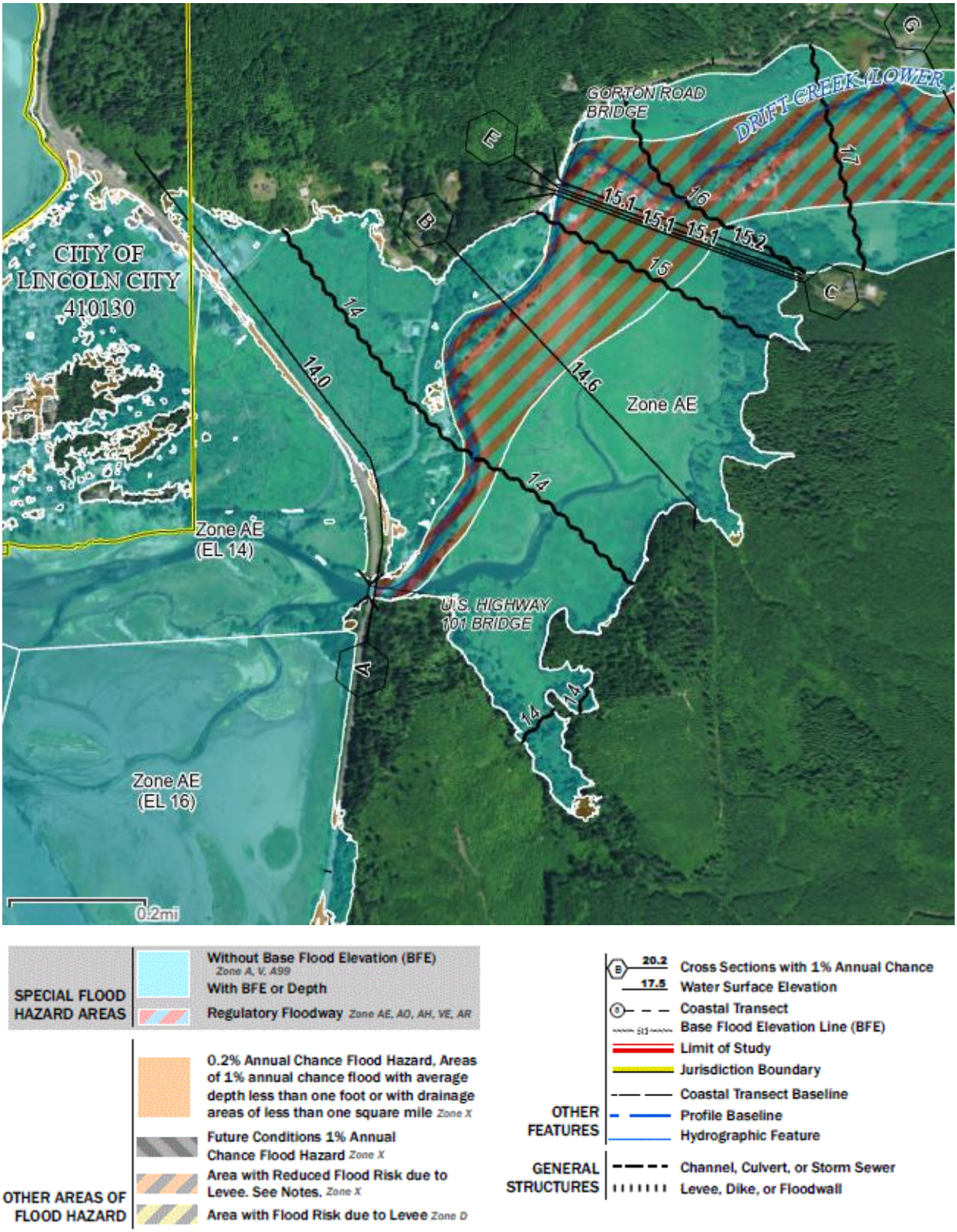
The Kangas Tract is primarily drained by a network of shallow, straight-line ditches with poor flushing and excessive deposition. The existing ditches total a volume of 380,000 cubic feet (14,000 cubic yards). Evidence of remnant tidal channels are extremely limited due to the long period of severely muted tidal flow. Beaver are frequently active on this tract.

Wetlands:
The National Wetland Inventory (NWI) maps most of the low-lying floodplain areas as palustrine emergent wetlands (PEM). Due to the presence of dikes and levees there are different water regime modifiers. Wetlands on the Shaffer Tract are mapped as temporarily

flooded, diked/impounded wetland (PEM1Ah). The Kangas Tract is mapped as seasonally flooded (PEM1C), and wetlands on the Watson Tract are mapped as seasonally flooded-tidal wetland (PEM1R). Small areas supporting trees and shrubs along Drift Creek are mapped as palustrine forested wetlands that are either temporarily flooded (PFOA) or seasonally flooded (PFOC) or seasonally flooded scrub-shrub wetlands (PSSC).

Floodplains:
Across the three tracts, general floodplain elevations range from +12 feet NAVD88 to +4 feet NAVD88 (W2r 2020). The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) for the project area maps flood zone AE across all the low-lying areas. Areas mapped in flood zone AE are subject to inundation by the 1-percent-annual-chance flood event, which is also known as the base flood or the 100-year flood. Drift Creek and areas adjacent to it are mapped as the regulatory floodway, which is a special flood hazard area (Figure 4). The Regulatory Floodway means the channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than a designated height. Development is not allowed in the regulatory floodway unless “no rise” in flood levels is certified. “No rise” means no increase in flood elevations greater than 0.00 feet.

Figure 4. Sections of FEMA FIRMs 41041C0117E and 41041C0136E Showing the Extents of the 1% Exceedance Flood (Base Flood) with Elevations in Feet NAVD88



Description of Environmental Trends and Planned Actions

The same environmental trends that affect habitat, vegetation, and wildlife (development and land use; climate change; and SLR) would also affect hydrology and floodplains.

Impacts on Affected Resource

Alternative A (Current Management):

Under the no-action alternative, tidal hydrology, fluvial hydrology, channel conditions, wetlands, and floodplains would remain as they are under current management and impacts to these resources would be neutral. The project area would remain as degraded wetlands. The Shaffer and Watson tract dikes would continue to mute tidal action, thus limiting full tidal function. The Shaffer and Watson tracts and surrounds would still flood during high tidal, fluvial, and/or precipitation conditions. The Kangas Tract would flood under seasonal high precipitation and hillslope drainage conditions and/or as a result of beaver ponding.

A two-dimensional hydraulic model was developed to inform existing hydraulic conditions within the project area (W2r 2021). The model is useful to compare existing and proposed alternative velocities, water surface elevations, inundation extends, and habitat features. The existing conditions terrain was developed by bathymetric survey in Drift Creek and the lower parts of South Slough, and a supplemental survey on the three land tracts. Modeling of existing conditions inundation extents during a king tide in January 2018 and during an estimated two-year flow in Drift Creek showed that the majority of the Shaffer Tract (excluding higher elevation areas on the northwest portion of the levee), lowland portions of the Watson Tract, and surroundings were flooded.

Alternative B (Preferred Alternative):

The preferred alternative would restore about 74 acres of estuarine-associated habitat, reducing the acreage of muted tidal wetlands, and increasing the functionality of tidal wetlands within Siletz Bay. Plant communities indicative of tidal wetlands are expected to become re-established in the project area. The restoration actions in the preferred alternative would increase hydrologic complexity and connectivity resulting in a multi-flow path network which would increase flow capacity and, therefore, allow water to move throughout the wetland and floodplain system more readily and regularly. The restored tidal water levels would flood portions of the Shaffer and Watson tracts daily. Tidal channel excavation and swale creation would occur on all three tracts and linear ditch filling would occur on the Kangas Tract. Approximately 17,800 linear feet of channels would be restored or enhanced. Roughly 4,500 linear feet of existing linear drainage ditches on the Kangas Tract would be filled to create more sinuous flow through existing and newly initiated tidal channels. On the Watson Tract, the historic (full size/shape) inlet to Watson Creek would be restored through debris (failed culvert) removal and reestablishing the channel outlet through excavation.

This resulting increased flow would increase sediment transport and nutrient exchange, improving the water quality and wetland habitat for aquatic organisms. The restored channel and wetland system would also improve drainage and flushing resulting in less ponding and stagnant water often used as mosquito breeding habitat. The hydrologic complexity and restored functional wetlands of preferred alternative would also provide resilience to climatic disturbances, such as SLR. Overall, in the long term, the relatively small scale of the (7% of historic estuary) preferred alternative would have minor to moderate long term beneficial effects to wetland functions.

Based on hydraulic modeling (W2r 2023), removal of the Shaffer and Watson dikes and the restoration and enhancement of tidal and floodplain channels would result in the following impacts to tidal hydrology, drainage, and inundation (compared to the baseline):

- During the flood tide, the project area would inundate faster and have a slightly higher peak elevation.
- During the ebb tide, water would drain faster and reach a lower final elevation that would be sustained until the next high tide cycle.
- Between tide cycles, the total area of standing water on the Shaffer Tract would be greatly reduced, including areas that were previously known to harbor mosquitoes.
- The duration of flood inundation would decrease within the Shaffer and Watson Tracts, as well as on neighboring private lands bordering these tracts. These modeling results indicate that the “net” effect of the project would be a slightly drier marsh surface on the Refuge and within bordering properties.

Hydraulic modeling of a two-year flood (assuming 3,590 cubic feet per second [cfs] flow on Lower Drift Creek coinciding with average tides) showed no change to flood risk at sensitive infrastructure adjacent to the project area (e.g., Gorton Road and infrastructure adjacent to it, existing residences bordering Drift Creek, and properties adjacent to Drift Creek Road) (W2r 2023). On Refuge lands, modeling of two-year flood conditions shows that the project objective of improving floodplain connection would be met.

Although this project does not require a formal floodplain development permit (“no rise” certification) since it would occur on federal lands, hydraulic modeling of base flood conditions (assuming 9,500 cfs on Lower Drift Creek) demonstrated that this project would meet all of the requirements in Lincoln County code and the national flood insurance program regulations for development within a Zone AE special flood hazard area. Project actions would slightly decrease flood risk to nearly all properties upstream and bordering the Shaffer and Kangas Tract during the base flood event. The only exceptions are the private residences closest to the Highway 101 bridge, which showed no change in flood risk.

On the Kangas Tract, the new/enhanced berm and access route along the eastern boundary of the tract would protect neighboring private properties from flooding, even under the scenario

of full tidal exchange (i.e., if the small culvert and berm on private property downstream of the tract fails, is removed, or otherwise incapable of restricting tidal flows).

The preferred alternative would re-establish historic floodplain channels and micro-channels that would help to drain the broader floodplain resulting in less undesirable flooding. The restored tidal wetlands would dissipate water more readily than current muted tidal wetlands leading to less concentrated flooding. Flooding would occur less frequently near infrastructure and increase in areas of the landscape that are naturally designed for flooding and water infiltration. Overall, in the long term, the relatively small scale (7% of the historic estuary) of the preferred alternative would have minor to moderate beneficial effects to floodplain function.

During restoration, wetlands would be temporarily disturbed through earth moving activities and heavy equipment. While the project would have minor temporary negative impacts, the overall benefits of reconnecting the floodplain by removing a dilapidated dike system and restoring or enhancing tidal and floodplain channels would improve habitat for fish and wildlife species and contribute to the recovery of anadromous fish.

Water Quality

Description of Affected Environment for the Affected Resource

The Drift Creek Arm of Siletz Bay is designated as water quality impaired by the Department of Environmental Quality exceeding water quality standards for temperature and *E*. *coli* (ODEQ 2022). Water quality standards are established to protect the beneficial uses of the waters. In the case of temperature, the most sensitive beneficial use is Oregon's native cold-water aquatic organisms such as salmon and trout. Temperatures that exceed the standard can negatively affect salmon and trout rearing and passage. Waters listed for *E. coli* are not of sufficient quality for contact recreation in freshwater lakes, rivers, and streams.

Proximity to roads could affect water quality within the project area. For example, Highway 101 directly abuts the Kangas Tract. Runoff from this road could deliver pollutants, heavy metals, oils, debris and sediment to the surrounding water and soils (USEPA 1995). These human-caused inputs can degrade water quality, harming aquatic and terrestrial organisms (USEPA 1995).

Description of Environmental Trends and Planned Actions

No known environmental trends or planned actions by nearby municipalities, state government, tribal government, other federal agencies, or other parties are likely to cause significant adverse effects to water quality relevant to the proposed Drift Creek Unit habitat restoration project area.

Impacts on Affected Resource

Alternative A (Current Management):
There would be no changes to the water quality since no changes would be made in the no-action alternative. The water quality would continue to be subjected to current management actions.

Alternative B (Preferred Alternative):
Beneficial long-term changes to water quality would result from the preferred alternative. Sediment would be conveyed more effectively from the creeks on the project area through removal of topographic barriers (i.e., dikes) and via restored and enhanced tidal and floodplain channels. The restored channel and marsh system would also improve drainage and flushing resulting in less ponding and stagnant water. The additional hydrologic features and new vegetated buffers, specifically in the Kangas Tract, would improve the filtration of road runoff specifically off Highway 101 improving the overall water quality of the site.

There would be the potential for some minor temporary impacts to water quality during restoration. Temporary impacts to water quality could result from exposure of soils during restoration. Exposed soils could erode at higher rates than under current conditions. However, the project area would be re-seeded with native plant species following BMPs to prevent erosion. Because of this and because the site is relatively flat, surface runoff after restoration would be low energy, and onsite erosion would be minimal. Therefore, the contribution of sediment to the local stream channels and the estuary from the proposed project are expected to be a less-than-significant adverse impact. Restoration activities would require the use of heavy equipment to move earth, disc the site, excavate the new culvert crossings and channels, and resurface the road. These activities pose the risk of water contamination from petroleum products. Implementation of BMPs and other measures associated with all construction activities, including working during the dry season, would reduce the likelihood of contamination. All impacts to water quality would be temporary and long-term impacts would be minimal and/or positive from the restored tidal wetland system. BMPs for erosion and sediment control would minimize adverse impacts.

Overall, in the long term, the relatively small scale (7% of historic estuary) of the preferred alternative would have minor to moderate beneficial effects to area water quality.

Air Quality

Description of Affected Environment for the Affected Resource

Lincoln County is an air quality "attainment area," meaning that the county consistently meets or does better than the clean air levels set by the U.S. Environmental Protection Agency in the National Ambient Air Quality Standards. EPA sets standards for six principal air pollutants known as "criteria air pollutants." These pollutants are found all over the U.S. and can harm human health and the environment. These include carbon monoxide (CO), lead (Pb), nitrogen

dioxide (NO_2), ozone (O_3), particulate matter (PM2.5 and PM10), and sulfur dioxide (SO_2). Lincoln County does not exceed the standards for any of these air pollutants.

Description of Environmental Trends and Planned Actions
No known environmental trends or planned actions by nearby municipalities, state government, tribal government, other federal agencies, or other parties are likely to cause significant adverse effects to air quality relevant to the proposed Drift Creek Unit habitat restoration project area.

Impacts on Affected Resource
Alternative A (Current Management):
There would be negligible impacts to air quality under Alternative A, as current conditions would be maintained.

Alternative B (Preferred Alternative):
Alternative B would cause direct, short-term, negligible to minor adverse impacts to air quality during construction or other on-the-ground activities. These impacts include exhaust emissions from off-road heavy equipment, on-road hauling, workers and employee commuting vehicles, and fugitive dust emissions from earthmoving activities. These impacts may extend beyond the project site.

Visitor Use and Experience

Description of Affected Environment for the Affected Resource
The Drift Creek Unit of Siletz Bay NWR is not open to public use (USFWS 2013). However, the navigable waters adjacent to the unit, including Drift Creek, are used by the public. Additionally, some limited observation and photography of wildlife within the Drift Creek Unit occurs from the roads adjacent to the unit (off-Refuge). Opportunities for wildlife-dependent recreation are available on other Refuge units and areas adjacent to the Refuge.

Streets in the proposed project area are county roads. There are no shopping or dining opportunities within or near to the proposed project site. No sidewalks exist in the proposed action area since it is in a rural environment. The nearest residences are located immediately adjacent to the east boundary of the Kangas Tract and across Drift Creek from the Shaffer Tract. Traffic on the local roads includes private automobiles, light and heavy (semi-trucks) commercial vehicles, delivery/service vehicles, farm equipment, and possibly bicycles. Traffic volume on these roads peak during business hours and during the summer months when tourists are visiting the Oregon Coast, most notably during the morning and evening rush hours and then reduces in volume during the middle of the day. Pedestrian traffic is low to non-existent near the proposed project site.

Impacts on Affected Resource

Alternative A (Current Management):
There would be negligible impacts to visitor use and experience under Alternative A, as the Drift Creek Unit is closed to public use, and current conditions would be maintained.

Alternative B (Preferred Alternative):
Alternative B would improve habitat conditions for the native fish and wildlife that use Siletz Bay, including salmonids and migratory birds. Consequently, implementation of this alternative would indirectly increase opportunities for wildlife-dependent recreation, visitor use, and/or increase the quality of these experiences beyond the project site (i.e., outside of the Drift Creek Unit). These indirect effects are anticipated to be long-term, beneficial, and negligible to minor.

Short-term, temporary impacts to off-Refuge public access and recreation during restoration activities may occur. For example, if the public intends to traverse Drift Creek, South Slough, or the Siletz River in watercraft (e.g., kayak or boat) while excavation of sediments or berms within or near channels is occurring, those individuals may be temporarily excluded from the work site for their safety. Also, during the removal of sediment, berms, and old infrastructure, there may be a temporary increase in sediment loading and transport in the immediate area of the work and downstream. This may cause temporary impacts to some recreational opportunities on the waterways. For example, fish may be temporarily disturbed by noise or sediments produced by heavy equipment. This may result in a minor and temporary decrease in fish activity until the noise stops and the sediment settles or dissipates.

Given the sparsity of pedestrian and vehicular traffic; the absence of local shopping, restaurants, or other attractions; and the general rural nature of the area, there are expected to be minimal, if any measurable effects from the proposed action on local residents, tourists, or other visitor uses.

Cultural and Historic Resources

Description of Affected Environment for the Affected Resource

The Refuge is located within the ancestral territory of the Siletz band of Tillamook people. Speakers of Tillamook, a Salish language, the original Siletz people can be seen as the southernmost of the Coast Salish people, who extend northward into British Columbia. The estuarine environment around the Refuge, Siletz Bay, and the lower Siletz River is known in Tillamook as Nach'-i-cal-chu (or Nachicolcho to early U.S. Coast Survey map makers) which literally means “quiet river place”, in contrast to the twisting Siletz River upstream. Leaders of the Siletz band of Tillamook people (or Seletsa Band of Tillamooks) signed the Coast Treaty with the United States on August 11, 1855, alongside other peoples from the entire coast, which promised to designate a large portion of the coast as a Reservation. On November 9, 1855, an overlapping portion of the coast was designated as a 1.1 million acre Reservation by President Franklin Pierce in fulfillment of treaties with inland peoples who were subsequently relocated. By this means, the Coast (or Siletz) Reservation was created and Siletz band of Tillamook people

became part of the Confederated Tribes of Siletz Indians (CTSI). However, the Coast Treaty was never ratified so the Siletz Band of Tillamook went uncompensated. A preexisting village site on the north side of the bay continued into the Reservation era. When the Reservation was divided into individual allotments in 1892, 10 CTSI tribal members took up allotment properties in lower Drift Creek. Although the areas which later became Siletz Bay NWR were prime locations for both prehistoric Native American villages and the homesteads of Reservation-era families, to date no archaeological sites have been recorded within the Refuge.

The Refuge and RHPO coordinates and consults with the SHPO and the interested tribal nations throughout restoration project planning and implementation. The Refuge has conducted informal consultation with the CTSI natural resources and cultural resources program leadership regarding this proposed project during annual meetings in 2020, 2021, and 2022. The Confederated Tribes of Grand Ronde were briefed on the project during an annual meeting in 2023.

Impacts on Affected Resource

Alternative A (Current Management):
There are expected to be negligible impacts to cultural resources under Alternative A as current management and conditions would be maintained. Routine maintenance activities under current management are undertakings of the type that have no potential to cause effects to cultural and historic properties that may exist in the maintenance location (36 CFR 800.3.a.1).

Alternative B (Preferred Alternative):
As under Alternative A, the Refuge would continue to comply with cultural resource investigation protocols prior to conducting ground disturbing actions and perform subsequent compliance with procedures if cultural resources are found. The formal NHPA consultation process was initiated internally through the Service's Regional Archeologist. During the consultation it was found that the Watson Tract levee, the Shaffer Tract levee, and the Kangas Tract drainage ditches are potentially eligible for listing on the National Register of Historic Places (NRHP) due to their age (built around 1946–1958 for the levees and 1919 and 2012 for the drainage ditches). As part of the identification effort, the Service recorded and evaluated the levees and drainage ditches on Oregon Inventory of Historic Properties Section 106 Forms and determined they are not eligible to the NRHP and are not contributing elements to any properties that are eligible. No other cultural resources were observed during the site survey conducted on February 21, 2023. Consequently, the Service determined the Lower Drift Creek Tidal Restoration Project – Siletz Bay NWR is a "no historic properties affected" outcome under 36 CFR 800.4.d.1 and it should proceed as planned. A final memo, indicating that no historic properties will be affected by the proposed project under Alternative B was issued on May 22, 2023. (USFWS 2023a).

Although there are no recorded archeological sites within the project area, the existence of cultural resources cannot be predicted with certainty. If human bones, burial remains, or other archeological or historic resources were inadvertently discovered and/or disturbed during

implementation of the proposed action, work should cease in the vicinity of the discovery and protocols identified in the "Procedures for Inadvertent Archeological Discoveries for the Oregon Coast National Wildlife Refuge Complex" would be implemented. Refuge activities in the affected area would not be resumed until appropriate clearance has been obtained from the Regional Archeologist.

Socioeconomics

Local and Regional Economies

Description of Affected Environment for the Affected Resource

Siletz Bay NWR is located along the northern Oregon Coast, in Lincoln County. In 2020, the population within Lincoln County was approximately 49,000. The median household income was $50,775, compared to the national figure of $64,994 (U.S. Department of Commerce 2020a). The unemployment rate in 2021 was 6.8%, compared to the national figure of 5.3% (U.S. Department of Commerce 2021). The top three employment sectors were accommodation and food services (16%), government (16%), and retail trade (14%) (U.S. Department of Commerce 2020b).

The project area is primarily zoned in agricultural/conservation, with some small portions on the east side of the Kangas Tract zoned in rural residential. In 2017, within Lincoln County, there were a total of 384 farm operations. The total farm-related income reported was $2.8 million (National Agricultural Statistics Service 2022).

Impacts on Affected Resource

Alternative A (Current Management):

There would be no changes to the local and regional land uses or economies with the no-action alternative. Current management would continue so the impacts would stay the same.

Alternative B (Preferred Alternative):

The preferred alternative is not likely to significantly impact the local economy. If local labor and equipment (e.g., heavy equipment rentals) is used for implementing the restoration, the effects on local employment and income may be minor and beneficial in the short term, especially by providing labor and income opportunities for local communities and individuals. If a contract is awarded to a contractor from out of the area, there may be small, temporary increases in local hotel and restaurant use, as well as potential contracted or sub-contracted project work (i.e., day workers). While this local spending and labor income would be a positive effect to local communities, it would represent a negligible percentage of the overall economy and would only be temporary.

The preferred alternative would not affect private land use surrounding the project area. Most of the single-family residents reside on small parcels and the occupants are either retired or work elsewhere away from their residence. Many private landowners have been in contact with

the Service regarding the proposed project via the public scoping meetings and/or one-on-one informal discussions or phone calls. During these interactions, Service staff did not encounter any individuals or concentration of minority, low-income, or other residents who would be adversely affected by the proposed restoration action. Many residents expressed support for the project and acknowledged an understanding of the scope, timing, and duration of the proposed action, as well as the potential for temporary increases in contractor and employee passenger vehicles, noise due to the use of heavy equipment on refuge lands, etc. None of the residents that the Service interacted with during the development of the alternatives expressed concern that restoration activities designed to improve the ecological processes and function of the local aquatic ecosystem would adversely affect their property, income, or livelihoods.

Adjacent private agricultural operations would continue as normal. Restoration activities would disturb soils and vegetation at the proposed restoration site, but this disturbance would be temporary and contained to Refuge land and would have no effect on the adjacent private properties value, income potential, or agricultural activities, which is currently only cattle grazing. The Service owns an access easement across the private farm from South Gorton Road to the Shaffer Tract that allows the Service to enter and exit Refuge lands and requires the Service to repair and maintain the access route. During restoration activities there would be an increase in vehicles and equipment moving along the Service's access route; however, this increase would be temporary and limited to normal business hours, so negligible effect is expected on the adjacent private landowner's operations or profits. Regularly accepted ranch and farming procedures would be implemented by all contractors and employees to ensure livestock are not injured or allowed to escape through the gates located along the access route. Thus, there would be no loss of livestock or income as a result of the proposed action. The Service has been in direct communications with the operator of the abutting agricultural property, and they are aware of the proposed action, timing, and duration of the restoration work, as well as the access route, equipment mobilization/demobilization loading and unloading area, and protocols that would be implemented to ensure the proposed project does not adversely affect their property or livelihood.

Environmental Justice

Description of Affected Environment for the Affected Resource

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires all federal agencies to incorporate environmental justice into their missions by identifying and addressing disproportionately high or adverse human health or environmental effects of their programs and policies on minorities and low-income populations and communities.

EJScreen is an environmental justice mapping and screening tool developed by the Environmental Protection Agency. This tool provides a nationally consistent dataset and approach for combining environmental and demographic indicators to assist in identifying environmental justice communities within a planning area. EJScreen maps data by census block

group. Data are provided as percentiles by block group. For example, if a given location is at the 80th percentile nationwide, this means that only 20 percent of the U.S. population has a higher block group value than the average in the location being analyzed. Table 3 provides socioeconomic indicators for the census block group 410419506013 encompassing the project area, in comparison with the state and United States.

TABLE 3. SOCIOECONOMIC INDICATORS FOR CENSUS BLOCK GROUP 410419506013, COMPARED TO OREGON AND THE UNITED STATES (USEPA 2022)

Socioeconomic Indicators	Value	Oregon Percentile	U.S. Percentile
Low income[1]	22%	37	39
Demographic index[2]	17%	26	39
People of color	12%	28	27
Limited English speaking	0%	0	0

[1] The percent of a block group's population in households where the household income is less than or equal to twice the federal "poverty level."

[2] Demographic Index is based on the average of two socioeconomic indicators: low-income and people of color.

Description of Environmental Trends and Planned Actions

No known environmental trends or planned actions by nearby municipalities, state government, tribal government, other federal agencies, or other parties are likely to cause significant adverse effects to minority and low-income populations relevant to the proposed Drift Creek Unit habitat restoration project area.

Impacts on Affected Resource

The Service has not identified any potential high and adverse environmental or human health impacts from this proposed action or any of the alternatives. Minority and low-income communities would not be disproportionately affected by any impacts from this proposed action or any of the alternatives. There would be no displacement of low-income or minority individuals or communities near the proposed project site, and no changes of land use that would adversely affect local incomes or taxes that may then constitute an economic hardship for these residents. There may, in fact, be labor and income opportunities available during the implementation of the proposed project.

Monitoring

The Oregon Coast NWR Complex prepared an inventory and monitoring plan (IMP) to describe the current or expected inventory and monitoring (I&M) activities selected to help Refuge staff (1) evaluate and refine efficacy of resource management actions and (2) measure progress toward achieving resource management objectives identified in refuge planning documents (USFWS 2023). Some surveys gather baseline data to develop practical and measurable

objectives for restoration projects or provide baseline data on biological integrity of a refuge. The IMP also includes cooperative surveys addressing resource issues of the Service at larger landscape scales beyond the Complex (e.g., ecoregion, seascape) or needs of other agencies and organizations. For cooperative surveys, refuge lands are one of multiple sites, including other refuges, to address broad-scale resource information needs. Although the IMP identifies many surveys that would need to be conducted, the number of surveys implemented on an annual basis is contingent upon multiple factors, including available funding and staffing as well as support from cooperators.

The following surveys described in the IMP are relevant towards ensuring that the actions proposed through this EA (Alternative B) would have no significant adverse impacts on the environment (Table 4):

TABLE 4. INVENTORY AND MONITORING RELATED TO THE DRIFT CREEK UNIT HABITAT RESTORATION PROJECT

Survey Name	Survey Type
Wetland Surface Water Level Monitoring and Water Quality Baseline Chemistry: Temperature and Salinity	Cooperative Monitoring to Inform Management
Invasive Plant Species - Distribution and Abundance	Monitoring to Inform Management
Habitat - Riparian Plant Species Out planting Effectiveness Monitoring - Shaffer Tract	Monitoring to Inform Management
Mosquito Adult and Larvae - Distribution and Abundance - Kangas and Shaffer Tracts	Monitoring to Inform Management
Fish - Species Distribution and Abundance - Restoration Effectiveness Monitoring - Kangas Tract, Shaffer Tract, Watson Tract	Cooperative Monitoring to Inform Management

In addition to the pre- and post-restoration monitoring identified in the IMP, there are permitting requirements for monitoring during restoration activities. For example, turbidity monitoring is required every two hours during in-water work to ensure that best management practices are implemented to meet the standard in rule of no more than a 10% increase in project caused turbidity above background levels.

Summary of Analysis

Alternative A – Current Management Strategies [No-Action Alternative]

Alternative A would not meet the purpose of and the need for action. As described above, under Alternative A, the Service would not restore 74 acres of estuarine-associated habitats within the Drift Creek Unit, thereby limiting wetland functions such as the provision of quality fish and wildlife habitat and resiliency to sea level rise and other effects of climate change. The historic loss of tidal wetland habitat and the current conditions of muted tidal flow on the Drift

Creek Unit (e.g., reduced tidal range, inundation frequency, and exchange) reduces the quantity and quality of available habitat for tidal wetland-associated species.

Alternative B – Restoration and Improvement of Additional Estuarine Habitat [Preferred Alternative]

Alternative B would restore about 74 acres of estuarine-associated habitats in the Drift Creek Unit. Doing so would result in short-term, minor adverse environmental impacts and considerations, and modest long-term benefits—improved water quality, sediment transport, climate change resilience, and native resident and migratory species recovery. Adverse impacts would be minimized through the implementation of BMPs.

This alternative would help meet the purpose and needs of the Service as described above because it would restore estuarine-associated habitats that had been lost or altered historically while increasing resiliency of new and existing tidal wetlands to climate change impacts and providing flood risk reduction. The proposed action would restore or enhance approximately 7% of the historic estuary, thereby contributing to the biological integrity, diversity, and environmental health of coastal ecosystems. Native fish and wildlife, including priority species such as coho salmon, would benefit from the improved quantity and quality of habitat. The Service has determined that the proposed action is compatible with the purposes of Siletz Bay NWR and the mission of the Refuge System. The impacts of Alternative B would be less-than-significant.

Alternative B would not result in significant adverse effects to the human environment. Implementing Alternative B would not affect public health or safety; would not result in disproportionately high or adverse human health or environmental effects on minorities and low-income populations and communities; would not result in effects that are highly uncertain or involve unique or unknown risks; would not negatively impact cultural resources or species listed under the federal ESA; would not cause the destruction of significant scientific, cultural, or historical resources; nor would it violate federal, state, or local law or requirements imposed for the protection of the environment.

Public Outreach and List of Agencies, Tribes, Organizations, and Persons Consulted

The Oregon Coast NWR Complex conducted public outreach during the scoping period to receive public input from interested parties including neighboring landowners and interested partner groups. The Service and partners conducted three public outreach meetings. The first meeting was held virtually on March 6, 2021, to share the existing site conditions, initial restoration concepts, and receive feedback from the public. Eighteen members of the community attended this meeting. The second meeting was held virtually on July 13, 2021, to present conceptual engineering designs and receive feedback on alternatives. Fifteen members of the community attended this meeting. The third meeting was held in person on October 2,

2021, at the Refuge to share preferred alternatives and modeling results. Thirteen members of the community attended this meeting.

In addition to the three official public meetings, refuge staff held site visits and had numerous meetings with neighbors and the general public to gather local knowledge about past site conditions, and flooding regimes from large rain and king tide events, etc. The Project Leader for the Oregon Coast Refuge Complex, Harry McQuillen, and Deputy Project Leader, Kate Iaquinto, conducted a door-to-door meet and greet with local neighbors on August 18, 2022. During the following weeks, we again attempted to meet additional landowners that had not been reached on August 18th. The public feedback from these meetings and conversations were incorporated into the alternative development.

During and outside of formal outreach regarding this proposed project, agencies, tribes, and organizations consulted or notified included:

- Bureau of Land Management
- Confederated Tribes of Siletz Indians
- Confederated Tribes of Grand Ronde Community of Oregon
- Lincoln County Commissioners and Planning Department
- MidCoast Watersheds Council
- National Oceanic and Atmospheric Administration
- Oregon Department of Fish and Wildlife
- Oregon Department of Environmental Quality
- Oregon Department of Transportation
- Oregon State Historic Preservation Office
- Oregon Watershed Enhancement Board
- Salmon-Drift Creek Watershed Council
- Wild Salmon Center

The Oregon Coast NWR Complex maintains a mailing list of local newspapers, radio, and websites, for news releases. In addition, information about the proposed action will be available at the Oregon Coast NWR Complex office in Newport, OR, on the Oregon Coast NWR Complex Facebook page, on the Salmon-Drift Creek and Mid-Coast Watershed Councils websites, and on the Siletz Bay NWR website, www.fws.gov/refuge/Siletz_Bay/.

The draft EA and project details were posted on the Refuge website to solicit public comment for 30 days from February 22 – March 23, 2023. Neighbors were notified of the availability of the draft EA via mail and other interested parties were contacted via email and press release. Copies were available at the Refuge Complex headquarters, 2127 SE Marine Science Drive, Newport, OR 97365. Comments or requests for additional information were submitted via email, fax, mail.

After the release of the draft EA, a public meeting was held on March 9th, 2023, at the Lincoln City Cultural Center and broadcast via Microsoft Teams to answer questions and solicit comments about the project. Twenty to twenty-five members of the community attended the meeting. The meeting started with Refuge staff presenting on the details of the project and explaining how comments could be submitted. After the presentation members of the public were able to ask questions and comment on the project. Refuge staff, the project engineers, and topic experts were present to respond to questions. Questions and comments made during the meeting were recorded and more detailed responses can be found in the response to comments in Appendix C.

We received 21 comments submissions including written comments submitted via email and verbal comments expressed at the public meeting. The Service's responses to comments received can be found in Appendix C.

All comments received from individuals become part of the official public record. All requests for such comments are handled in accordance with the Freedom of Information Act and the CEQ's NEPA regulations in 40 CFR 1506.6(f). The Service's practice is to make comments, including names and home addresses of respondents, available for public review during regular business hours. Individual respondents can request that we withhold their home address from the record, which we will honor to the extent allowable by law. The following notice was included in the draft EA "If you wish us to withhold your name and/or address, you must state this prominently at the beginning of your comments".

List of Preparers

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Kate Iaquinto, Deputy Project Leader, U.S. Fish and Wildlife Service – Oregon Coast National Wildlife Refuge Complex

Determination

This section will be filled out upon completion of the public comment period and at the time of finalization of the Environmental Assessment.

☐ The Service's action will not result in a significant impact on the quality of the human environment. See the attached **"Finding of No Significant Impact".**

☐ The Service's action **may significantly affect** the quality of the human environment and the Service will prepare an Environmental Impact Statement.

Signatures

Submitted By:

Project Leader Signature: HARRY MCQUILLEN Digitally signed by HARRY MCQUILLEN Date: 2023.07.05 13:55:07 -07'00' **Date:** 07/05/2023

Concurrence:

Refuge Supervisor Signature: ANGELA ANDERS Digitally signed by ANGELA ANDERS Date: 2023.07.05 15:36:48 -06'00' **Date:** 7/5/2023

Approved:

Assistant Regional Director,

National Wildlife Refuge System Signature: SARENA SELBO Digitally signed by SARENA SELBO Date: 2023.07.10 17:59:06 -05'00'

Date: 7/10/2023

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W2r. 2023. *Flood Risk and Hydraulic Modeling.* Prepared for the MidCoast Watershed Council, U.S. Fish and Wildlife Service Oregon Coast National Wildlife Refuge Complex, Salmon-Drift Creek Watershed Council, and Confederated Tribes of Siletz Indians. 4 pp.

Appendix A

Environmental Review and Compliance

The following executive orders and legislative acts have been reviewed as they apply to the proposed action:

Cultural Resources

Executive Order 11593: Protection of Historical, Archaeological, and Scientific Properties, the National Historic Preservation Act of 1966 (NHPA), as amended (16 U.S.C. 470-470x), and Executive Order 13007 – Indian Sacred Sites, 61 Fed. Reg. 26771 (1996)
Executive Order 11593 established the policy that the federal government provide leadership in preserving, restoring, and maintaining the historic and cultural environment of the United States. Section 106 of the NHPA requires federal agencies to take into account the effects of their undertakings on historic properties. The Service conducted an inventory of cultural resources to assess potential undocumented archeological, or historic sites (36 CFR 800.3.a.1. the implementing regulations of Section 106 of the NHPA) and reported the findings to the Oregon State Historic Preservation Office (SHPO). The Service received no response from the SHPO after the required 30 day waiting period. A final memo, indicating that no historic properties will be affected by the proposed project under Alternative B was issued on May 22, 2023. (USFWS 2023a).

Fish and Wildlife

Endangered Species Act of 1973 (16 U.S.C. § 1531 et seq.)
The ESA directs all federal agencies to work to conserve endangered and threatened species and to use their authorities to further the purposes of the ESA. Section 7 of the ESA is the mechanism by which federal agencies ensure their actions do not jeopardize the existence of any listed species. Under Section 7, federal agencies consult with the Service or National Marine Fisheries Service (NMFS) when any action they carry out, fund, or authorize may affect a listed species.

For terrestrial species, the Refuge has documented an internal informal consultation with a memorandum stating that the proposed project has no effect on any listed species or designated critical habitat.

For aquatic species, including the Oregon coast coho salmon, the proposed actions require consultation with NMFS. The Bureau of Land Management (BLM) has agreed, due to their involvement in the project as a contributing partner, to serve as the lead federal agency for permitting the proposed work. The proposed actions impacting aquatic species, fall under the activity categories and associated project design criteria listed in the programmatic “Aquatic Restoration Activities in States of Oregon and Washington” Biological Opinion (commonly referred to as ARBO II) issued by NMFS. The Service and the BLM, will follow the ARBO II

permitting pathway, indicating that the project may affect, and is likely to adversely affect Oregon coast coho salmon, eulachon, and green sturgeon, but would not jeopardize their continued existence or destroy or adversely modify designated critical habitat. A pre-work notification for the activities covered under ARBO II, including but not limited to the proposed project activities and corresponding metrics in relation to those activities (i.e., cubic yards of material excavated, number of large wood placed) was reported to NMFS concurrently with the release of the draft EA.

Fish and Wildlife Coordination Act, as amended in 1964, 15 U.S.C. § 661 et seq.
Requires that all federal agencies consult with NMFS, U.S. Fish and Wildlife Service, and state wildlife agencies when proposed actions might result in modification of a natural stream or body of water. Federal agencies must consider effects that these projects would have on fish and wildlife development and provide for improvement of these resources. The Fish and Wildlife Coordination Act allows these agencies to provide comments to the lead federal action agency (the Refuge) during their review of the proposed project. The Refuge has consulted and coordinated with all relevant fish and wildlife agencies to reduce adverse impacts to migratory, estuarine, and marine fisheries and their habitats.

Magnuson-Stevens Fishery Conservation and Management Act (MSA), 16 U.S.C. § 1801 et seq. Reauthorized by the Sustainable Fisheries Act of 1996:
Congress enacted the MSA to provide the Secretary of Commerce, by and through NMFS, authority to regulate domestic marine fisheries in need of conservation and management. Federal fisheries management is accomplished through Fishery Management Plans (FMPs) developed and prepared by regional Fishery Management Councils (or the Secretary through NMFS where appropriate) and approved, implemented, and enforced by NMFS. Each FMP must identify essential fish habitat (EFH) for the fishery and minimize adverse fishing impacts to the extent practicable. In addition, Federal agencies must consult with NMFS on any action that may adversely impact EFH. Activities implemented by the Refuge would support the goals of this legislation by restoring and protecting EFH and contributing to the conservation and management of these managed fish habitats. BLM will serve as the lead federal agency for formal consultation with NMFS regarding EFH and compliance with the requirements of the MSA is covered by the programmatic biological opinion known as ARBO II.

Migratory Bird Treaty Act, as amended, 16 U.S.C. 703-712; 50 CFR Parts 10, 12, 20, and 21 and Executive Order 13186 – Responsibilities of Federal Agencies to Protect Migratory Birds, 66 Fed. Reg. 3853 (2001)
The preferred alternative is consistent with the Migratory Bird Treaty Act, and Executive Order 13186 because the EA evaluates the effects of agency actions, including proposed actions, on migratory birds.

Natural Resources

Clean Water Act, 33 U.S.C. 1251 et seq. and Rivers and Harbors Act of 1899, 33 U.S.C. 401 et seq.

The Clean Water Act (CWA) establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. Under Section 401 of the CWA, a federal agency may not issue a permit or license to conduct any activity that may result in any discharge into waters of the United States unless a Section 401 water quality certification is issued, or certification is waived. States and authorized tribes where the discharge would originate are generally responsible for issuing water quality certifications. Section 404 of the CWA establishes a permitting program for discharges of dredged or fill material into waters of the United States, including wetlands.

The Rivers and Harbors Act of 1899 (RHA) is the initial authority for the U.S. Army Corps of Engineers (ACOE) regulatory permit program to protect navigable waters in the development of harbors and other construction and excavation. Section 10 of the RHA (33 U.S.C. Sec. 403) prohibits the unauthorized obstruction or alteration of any navigable water of the U.S. This section provides that the construction of any structure in or over any navigable water of the U.S., or the accomplishment of any other work affecting the course, location, condition, or physical capacity of such waters is unlawful unless the work has been recommended by the Chief of Engineers and authorized by the Secretary of the Army. The Secretary's approval authority has since been delegated to the Chief of Engineers. Activities requiring section 10 permits include structures (e.g., piers, wharfs, breakwaters, bulkheads, jetties, weirs, transmission lines) and work such as dredging or disposal of dredged material, or excavation, filling, or other modifications to the navigable waters of the United States.

The proposed actions within the Drift Creek Unit habitat restoration project includes aquatic restoration activities authorized by a regional general permit issued by the ACOE. This regional general permit is for conducting "Aquatic Habitat Restoration Activities Within the State of Oregon" (commonly referred to as RGP-4). The BLM will serve as the lead permitting agency and will follow the RGP-4 permitting pathway to comply with the CWA Sections 401 and 404 and RHA Section 10. The Oregon Department of Environmental Quality issued a Section 401 Water Quality Certification covering activities under RGP-4. A pre-work notification for the activities covered under RGP-4, including but not limited to the proposed project activities and corresponding metrics in relation to those activities (i.e., cubic yards of material excavated, number of large wood placed) was reported to ACOE concurrently with the release of the Draft Environmental Assessment.

Coastal Zone Management Act of 1972, 16 U.S.C. 1451 et seq.; 15 CFR Parts 923, 930, 933:

The Coastal Zone Management Program is a national program. It addresses coastal issues in coastal states and Great Lakes states and territories. The program is a partnership between the federal government and these states or territories. Authorized by the Coastal Zone Management Act (CZMA) of 1972, the program provides the basis for protecting, restoring, and

responsibly developing our nation's diverse coastal communities and resources. The Oregon Coastal Management Program (OCMP) is the state of Oregon's implementation of the national program. The Service has worked with stakeholders including the Confederated Tribes of Siletz Indians, two Watersheds Council, adjacent private landowners, Oregon Department of Transportation, and ODFW to develop the Drift Creek Habitat Restoration Project. We have determined that the activities outlined in the Plan are consistent with the Siletz Bay NWR Comprehensive Conservation Plan. As stated above, the project activities are permitted under ACOE RGP-4. OCMP has issued concurrence with the conditions for the proposed activities covered by the ACOE RGP-4 (see RGP-4 attachment 4). The consistency decision requires that the project be covered by a DEQ issued water quality certification, be consistent with local regulations when applicable and submit verification that the project has been successfully covered by RGP-4 to the OCMP. The project has met all requirements including RGP-4 verification received on May 26, 2023.

Estuary Protection Act, 16 U.S.C. § 1221 et seq.
The Estuary Protection Act ensures conservation of sensitive estuary ecosystems and habitats through sound management of estuary resources. By intent, the activities proposed by the Refuge will have no long-term adverse impacts on the Siletz Bay estuary and would be conducted specifically to result in long-term or permanent beneficial impacts to restore and improve habitats within the estuary.

Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), and Secretarial Order 3127
Secretarial Order 3127 and CERCLA require federal agencies to evaluate the environmental condition of property and to take remedial actions as necessary to protect human health and the environment. USFWS queried the Environmental Data Resources database, which revealed no hazardous waste sites within or near the project area. A windshield survey of the project site failed to locate any hazardous materials within areas affected by the project.

Executive Order 11988: Floodplain Management
Executive Order (EO) 11988 (and revised by EO 13690) requires federal agencies to avoid, to the extent possible, and to manage long- and short-term adverse impacts associated with the occupancy and modification of floodplains wherever there is a practicable alternative. One of the main requirements under these Executive Orders is public notice of activities in the floodplain, as well as compliance with NEPA. As required, the Service has conducted public scoping and completed this EA for public comment. Since the project is taking place entirely on public lands, it is not subject to local floodplain regulations.

The project has minimized impacts to floodplains. The EA section on impacts to hydrology and floodplains summarizes the impacts to floodplains.

Executive Order 11990: Protection of Wetlands

Executive Order 11990 requires federal agencies to avoid, to the extent possible, long- and short-term adverse impacts associated with the destruction or modification of wetlands and to avoid direct or indirect support of new construction in wetlands wherever there is a practicable alternative. While the project would have temporary negative impacts on wetlands, the Service determined that the overall benefit of reconnecting the floodplain by removing a dilapidated dike system, restoring historic channel alignment would improve aquatic habitat for fish and wildlife species and contribute to the recovery of anadromous fish. Project improvements are anticipated to gain coverage under the aforementioned RGP-4.

Executive Order 13112 – Invasive Species, 64 Fed. Reg. 6183 (1999)

The proposed action is consistent with Executive Order 13112 because implementation of the proposed action will include mitigation measures such as cleaning of machinery and native plant seeding to limit the spread and introduction of invasive species.

National Environmental Policy Act of 1969 (42 U.S.C. §4321 et seq.)

As a federal agency, the Service must comply with the provisions of NEPA, as amended (42 U.S.C. §4321 et seq.). NEPA requires an analysis of alternatives that would meet stated objectives and an assessment of the reasonably foreseeable effects to the human environment. This EA meets NEPA requirements by examining and disclosing the reasonably foreseeable effects to the human environment resulting from the Service's decision.

Socioeconomics

Executive Order 12898: Federal Actions to Address Environmental Justice in Minority and Low-Income Populations

All federal actions require the federal government to address and identify, as appropriate, disproportionately high and adverse human or environmental effects of its programs, policies, and activities on minority populations, low-income populations, and Indian Tribes in the United States. The proposed action would comply with Executive Order 12898 because minority or low-income communities would not be disproportionately affected by any impacts from this proposed action.

Appendix B

Species Lists

TABLE B-1. PLANT SPECIES MENTIONED IN THE ENVIRONMENTAL ASSESSMENT (IN ALPHABETICAL ORDER OF COMMON NAME)

Common Name	Scientific Name
Baltic rush	*Juncus balticus*
bigleaf maple	*Acer macrophyllum*
cascara	*Rhamnus purshiana*
cordgrass	*Spartina* spp.
creeping bentgrass	*Agrostis stolonifera*
creeping spikerush	*Eleocharis palustris*
Douglas spiraea	*Spiraea douglasii*
English holly	*Ilex aquifolium*
English ivy	*Hedera helix*
Himalayan blackberry	*Rubus ulmifolius*
Hooker willow	*Salix hookeriana*
huckleberry	*Vaccinium ovatum*
Japanese knotweed	*Fallopia japonica*
Lyngbye's sedge	*Carex lyngbyei*
meadow barley	*Hordeum brachyantherum*
Nootka rose	*Rosa nutkana*
Pacific crabapple	*Malus fusca*
Pacific ninebark	*Physocarpus capitatus*
Pacific silverweed	*Potentilla anserina pacifica*
Pacific wax myrtle	*Morella californica*
pickleweed	*Salicornia depressa*
red alder	*Alnus rubra*
red elderberry	*Sambucus racemose*
red-flowering currant	*Ribes sanguineum*
red-osier dogwood	*Cornus sericea*
reed canarygrass	*Phalaris arundinacea*
salal	*Gaultheria shallon*
salmonberry	*Rubus spectabilis*
salt grass	*Distichlis spicata*
Scotch broom	*Cytisus scoparius*
shortawn foxtail	*Alopecurus aequalis*
Sitka spruce	*Picea sitchensis*
Sitka willow	*Salix sitchensis*

Common Name	Scientific Name
skunk cabbage	*Lysichiton americanus*
slough sedge	*Carex obnupta*
soft rush	*Juncus effusus*
sword fern	*Polystichum munitum*
tansy ragwort	*Senecio jacobaea*
thimbleberry	*Rubus parviflorus*
thistle	*Cirsium* spp.
tufted hairgrass	*Deschampsia cespitosa*
twinberry	*Lonicera involucrata*
vine maple	*Acer circinatum*
western hemlock	*Tsuga heterophylla*
western redcedar	*Thuja plicata*

TABLE B-2. AVIAN SPECIES MENTIONED IN THE ENVIRONMENTAL ASSESSMENT (IN ALPHABETICAL ORDER OF COMMON NAME)

Common Name	Scientific Name
American wigeon	*Mareca americana*
bald eagle	*Haliaeetus leucocephalus*
band-tailed pigeon	*Patagioenas fasciata*
belted kingfisher	*Megaceryle alcyon*
bufflehead	*Bucephala albeola*
common merganser	*Mergus merganser*
dunlin	*Calidris alpina*
gadwall	*Mareca strepera*
great blue heron	*Ardea herodias*
hooded merganser	*Lophodytes cucullatus*
mallard	*Anas platyrhynchos*
marbled murrelet	*Brachyramphus marmoratus*
northern harrier	*Circus cyaneus*
northern pintail	*Anas acuta*
northern spotted owl	*Strix occidentalis caurina*
Pacific wren	*Troglodytes pacificus*
peregrine falcon	*Falco peregrinus*
red-tailed hawk	*Buteo jamaicensis*
western Canada goose	*Branta canadensis moffitti*
western snowy plover	*Charadrius nivosus*
wood duck	*Aix sponsa*

TABLE B-3. FISH SPECIES MENTIONED IN THE ENVIRONMENTAL ASSESSMENT (IN ALPHABETICAL ORDER OF COMMON NAME)

Common Name	Scientific Name
buffalo sculpin	*Enophrys bison*
Chinook salmon	*Oncorhynchus tshawytscha*
coastal cutthroat trout	*Oncorhynchus clarki*
coho salmon	*Oncorhynchus kisutch*
English sole	*Parophrys vetulus*
eulachon	*Thaleichthys pacificus*
green sturgeon	*Acipenser medirostris*
Pacific lamprey	*Entosphenus tridentatus*
Pacific staghorn	*Leptocottus armatus*
shiner perch	*Cymatogaster aggregate*
steelhead trout	*Oncorhynchus mykiss*

TABLE B-4. MAMMAL SPECIES MENTIONED IN THE ENVIRONMENTAL ASSESSMENT (IN ALPHABETICAL ORDER OF COMMON NAME)

Common Name	Scientific Name
beaver	*Castor canadensis*
black-tailed deer	*Odocoileus hemionus*
deer mice	*Peromyscus maniculatus*
mink	*Mustela vison*
muskrat	*Ondatra zibethicus*
Pacific marten	*Martes caurina*
raccoon	*Procyon lotor*
river otter	*Lontra canadensis*
Roosevelt elk	*Cervus elaphus canadensis*

TABLE B-5. REPTILE AND AMPHIBIAN SPECIES MENTIONED IN THE ENVIRONMENTAL ASSESSMENT (IN ALPHABETICAL ORDER OF COMMON NAME)

Common Name	Scientific Name
garter snake	*Thamnophis* spp.
leatherback sea turtle	*Dermochelys coriacea*
loggerhead sea turtle	*Caretta*
long-toed salamander	*Ambystoma macrodactylum*
northern alligator lizard	*Elgaria coerulea*
olive ridley sea turtle	*Lepidochelys olivacea*

Common Name	Scientific Name
Pacific tree frog	*Pseudacris regilla*
red-legged frog	*Rana aurora*
rough-skinned newt	*Taricha granulosa*
western red-backed salamander	*Plethodon vehiculum*

Appendix C

Comments Received During Public/Agency Review Period and U.S. Fish and Wildlife Service Responses

The Draft Environmental Assessment (EA) for Siletz Bay National Wildlife Refuge (NWR, Refuge) Drift Creek Unit Habitat Restoration was released for a 30-day public comment period from February 22, 2023, to March 23, 2023. The U.S. Fish and Wildlife Service (Service) received 21 comment submissions including written comments submitted via email and verbal comments expressed at the public meeting.

Comments focused on issues identified through public scoping and on the alternative actions developed through public input. A large proportion of the commenters expressed concerns for the effects to neighboring properties and infrastructure or suggested changes to design components.

Comments received were grouped into 13 categories: Support Alternative A, Support Alternative B, Other Alternatives, Historic Conditions, Tribes and Cultural Resources, Impact to Neighbors, Analysis, Modeling and Data, National Environmental Policy Act (NEPA) Planning Process, Infrastructure, Wildlife and Vegetation, Hydrology and Soil, Construction, and Other.

Comments presented in this appendix have been paraphrased from the originals, and in some cases consolidated with others where the Service's response is the same.

Support Alternative A – Current Management Strategies (No-Action Alternative)

Comment 1: A couple comments were received in support of Alternative A.

The preferred alternative was chosen because it accomplishes the proposed project's purpose to restore estuarine-associated habitats in the Drift Creek Unit of the Siletz Bay NWR to improve habitat for native fish and wildlife, including threatened coho salmon. Alternative A would only maintain the status quo, offering no increase in tidal marsh habitat and no improvement of conditions for plant, fish, and wildlife. This would not accomplish the National Wildlife Refuge System's mission or the purposes for which the Siletz Bay NWR were established.

Support Alternative B – Restoration and Improvement of Additional Estuarine Habitat (Preferred Alternative)

Comment 2: Multiple comments were received in support of Alternative B and emphasized the importance of restoration being done correctly.

The Service agrees it is important that restoration be done with care and that unintended negative impacts are mitigated as much as possible. Consequently, the Service worked with agency and industry professionals to develop the proposed alternative and used the best available science and technology (e.g., floodplain modeling). We held numerous meetings and

site visits with neighbors and the general public to gather local knowledge about past site conditions, and flooding regimes from large rain and king tide events, etc. We will conduct post-restoration monitoring to help understand the effectiveness of the restoration at the proposed project site.

Other Alternatives

Comment 3: One comment proposed an addition to the restoration design of the Kangas Tract that would connect tidal channels from that unit to Drift Creek by passing under Drift Creek Road.

The Service considered including a tidal channel under Drift Creek Road in the proposed restoration design, but this strategy was dismissed due to cost and because it would have required work on private and county owned land. More specifically, to improve direct hydrologic connectivity of the Kangas Tract, the installation of a new culvert and channel connection between the Tract and Lower Drift Creek was considered. This connection would require a new culvert underneath South Drift Creek Road. The primary benefit of this new tidal channel connection and culvert would be that its hydrologic connection would not be constrained by the existing dilapidated culvert and berm (located downstream on private land) between Kangas Tract and Siletz Bay. However, this option was not explored further due to the anticipated high cost of a new culvert structure. An additional concern was the need for the culvert to go through private and county owned land.

Historic Conditions

Comment 4: One comment mentioned that there are historic interview records from Siletz Tribal elders discussing an abundance of clams in lower Drift Creek and Schooner Creek that have declined over time.

The preferred alternative intends to restore historical hydrological conditions to the extent practicable. The restoration may create tidal conditions that are more favorable for clams, mussels, and other small invertebrates who thrive on the Refuge and the surrounding waterways. The Terrestrial Wildlife and Aquatic Species section of the Environmental Consequences chapter of the EA provides more detail on the anticipated restored habitat conditions, based on the historic information that was available at the time the proposed project was developed.

Tribes and Cultural Resources

Comment 5: One comment expressed concerns about how the history of the Native American Tribes in the area was described in the EA. The commentor mentioned that a lot of the history including information about treaties and reservations is missing from the Cultural and Historic Resources section.

The Service recognizes the importance of acknowledging the full history of the traditional inhabitants of this land. The language in the description of the cultural and historic resources affected environment section on page 42 in the Final EA was augmented to further describe the indigenous history of the area.

Comment 6: One comment asked about how the Refuge worked with the Confederated Tribes of Siletz Indians on the proposed project.

The Service has consulted with tribes on the Oregon Coast for decades. We were in direct contact and consultation with the Confederated Tribe of Siletz Indians and the Confederated Tribes of the Grand Ronde Community of Oregon regarding the proposed restoration project. We received input from both tribes on this EA. This consultation is discussed further in the Cultural and Historic Resources section of the Affected Environmental chapter and the Public Outreach section.

Comment 7: One comment expressed concern and appreciation for recognizing and limiting disturbance to cultural resources throughout the implementation of the proposed project.

The Service conducted a cultural resource investigation for the proposed project as required by the National Historic Preservation Act and permitting agencies. The Watson Tract levee, the Shaffer Tract levee, and the Kangas Tract drainage ditches are potentially eligible for listing on the National Register of Historic Places (NRHP) due to their age (built around 1946–1958 for the levees and 1919 and 2012 for the drainage ditches). As part of the identification effort, the Service recorded and evaluated the levees and drainage ditches on Oregon Inventory of Historic Properties Section 106 Forms and determined they are not eligible to the NRHP and are not contributing elements to any properties that are eligible.

No other cultural resources were observed during the site survey conducted on February 21, 2023. Consequently, the Service determined the Lower Drift Creek Tidal Restoration Project – Siletz Bay NWR is a “no historic properties affected” outcome under 36 CFR 800.4.d.1 and it should proceed as planned. The report, detailing these findings, was submitted to the State Historic Preservation Office.

The Service will operate under the ““Procedures for Inadvertent Archeological Discoveries for the Oregon Coast National Wildlife Refuge Complex” document referenced in the EA. This document was developed in collaboration with our tribal partners during work related to the proposed project. Service staff and contractors will be trained on the protocol outlined in the document and will follow it during all work activities.

<u>Impacts to Neighbors</u>

Comment 8: Two comments expressed concern about flooding on low lying neighboring properties.

The Service's objectives for the proposed project are to restore and enhance tidal marsh and forest habitats within Siletz Bay NWR. The work described in the EA is restricted to Refuge lands. Hydraulic modeling developed during the alternative analysis and planning of the proposed project was conducted to evaluate potential flooding impacts of restoration (as represented by the 90% design drawings). Hydraulic modeling results show no significant off-Refuge effects, including the extent of inundation, tidal flushing and exchange, and the wetting and drying periods for the three tide conditions modelled (king tides, base flood, and 100-year flood).

The hydraulic modeling evaluation performed is consistent with local and federal regulatory floodplain requirements and engineering professional standards and practices. The hydraulic modeling approach used has high scientific and engineering rigor and uses an industry standard hydraulic modeling computer program and general methodology. To our knowledge and understanding of Drift Creek and Siletz Bay, the methodology used is appropriate and sufficient for evaluation of potential changes in hydraulic conditions including inundation extents, velocities, depths, and general hydraulic risks.

Comment 9: One comment expressed concern about the impacts to the Confederated Tribes of Siletz Indian's fishing area on Drift Creek.

The proposed project should not have any effect upstream of the proposed project site. The Confederated Tribes of Siletz Indians Drift Creek Cultural Fishing Site is located approximately 1.5 miles upstream, near Wapiti Park. Ultimately, these restoration sites should contribute positively to the survival and recovery of salmon in the Drift Creek system by allowing juvenile salmon access to additional floodplain habitat where they have been shown to grow larger in a shorter amount of time due to the abundance of food resources that are not available within a confined channel. The proposed project could marginally improve fishing opportunities at the cultural fishing site over time.

Comment 10: Two comments expressed concern about debris congestion and log jams within the Drift Creek system causing surrounding flooding.

Log jams naturally occur in streams (Manners et al. 2007) and provide beneficial habitat to salmon and other wildlife (Zalewski et al. 2003). During a site visit between the Service and its neighbors in October 2021, we learned of a large log jam located upstream only accessible through private property. This log jam naturally cleared. Log jams and debris congestion on Drift Creek and South Slough are inherently unpredictable events, and the timing or occurrence of them cannot be predicted or modeled. Thus, the current hydraulic analyses of future flood events are based on current conditions, and the proposed design does not account for former or potential future large log jams in the creek. Moreover, the proposed restoration is not expected to affect the likelihood or potential for future log jams to develop in the location of the prior log jam. That jam was over half a mile upstream from proposed bank regrading or other changes within the proposed project site. Predicted changes in hydraulics under the

proposed restoration do not extend that far upstream.

Related to this issue, but a separate consideration, large wood has been incorporated into the proposed project for each tract to help mimic mature spruce swamp, where spruce trees have fallen onto the floodplain and into the tidal channels. The Service will partially bury the wood and anchor it into the sediment to ensure it remains in place for increased habitat texture while new plantings of willow, spruce, hemlock, etc. are established to provide habitat and floodplain functions for wildlife. The installed large wood also is expected to reduce energy and scour potential during very large floods. Modeling shows minimal to no increase in water velocities flowing onto or across the Shaffer Tract floodplain, so large wood placed during the proposed project should remain in place. This wood, on the interior of the site, may also capture natural logs and debris coming from Drift Creek or on flood tides, thereby increasing the quality of habitat over time. This is beneficial for the wildlife using this newly created habitat. If too much debris builds up over time, the Service may choose to remove some of it, or reposition it in other areas to provide even more benefits to the floodplain and wildlife.

Comment 11: Two comments expressed concern about how water will drain off private property adjacent to the Kangas Tract with a new tide gate and berm being constructed as a part of the proposed project.

The culverts and tide gates being installed in the new berm along the private property on the east side of the Kangas Tract are designed to allow water flowing from the creek (also referred to as a ditch) on the northeast end of the Kangas Tract to drain into the Kangas Tract wetland and away from the private property. The culverts and tide gates would be activated primarily during high flows in the local creek, such as major rain events when creek water levels are higher than those in the downstream wetland. The culverts and tide gates would also prevent high tidal waters from backing up (flowing upstream or generally north) from the wetland and onto the private property after the proposed project occurs and tidal exchange improves. This design is intended to maintain or reduce existing levels of flood risks for our neighbors while providing the greatest amount of value to wildlife using the Kangas Tract (it ensures adequate flows of freshwater into the Kangas Tract wetland).

The berm proposed along the eastern boundary of the Kangas Tract is a safeguard against the potential failure of a dilapidated, unserviceable, and unmaintained culvert located downstream from the proposed project site and located on private land. If culvert on private land were to fail, higher tidal water levels from the bay would inundate the Kangas tract and the proposed berm would prevent flooding on private properties during very high tides.

The proposed berm is designed to be the same height as Drift Creek Road to protect against high tide-based flooding. If floodwaters exceed the height of Drift Creek Road and affect the private property, the floodwaters would drain through the Kangas Tract and through the berm via the tide gates located at either end, similar to what would happen without the berm and tide gates. The time it would take for the private property to drain depends on the amount of

rainwater or floodwater that enters the private property and on the natural recession or dropping of the water levels in the Kangas Tract and the creek and bay downstream.

Comment 12: One comment asked if any improvements would be made to the access easement on the Alger Trust property for the proposed project.

The Service has an access easement across the Alger Trust land to the Shaffer Tract. Per the easement, the Service will "repair and maintain and keep repaired in a proper workmanlike manner" the access road, fence, and gates, along Drift Creek within the legal bounds of the easement language. The Service intends to work collaboratively with the Alger family to maintain this easement to the benefit of both parties; however, any proposed modifications to the access agreement on the Alger Trust property is outside of the scope of the proposed project so it is not addressed in the EA.

Comment 13: One comment asked if the ditch lining the private property on the Kangas Tract will have less water in it with the implementation of the proposed project.

The ditch referenced in this comment runs to the east and north along the proposed new berm on the eastern boundary of the Kangas Tract. The primary function of the ditch lining the private property is explained in response to Comment 11 above. For normal seasonal (non-flood) conditions, we expect the ditch to have about the same amount of water in it with the proposed project. During very high tidal water levels, the ditch would have less water in it than it currently does.

In the future, if the downstream berm/culvert is fully breached or if it is otherwise removed, groundwater levels in the wetland and vicinity of the ditch may increase somewhat (i.e., up to 6 inches) due to improved tidal connectivity and exchange. The groundwater level would increase only up to mean tide or slightly above it, which is approximately elevation 5 feet NAVD88 – which is well below general ground elevations of the private property.

Analysis, Modeling, and Data

Comment 14: One comment asked if the Service used or conducted any elevation surveys to evaluate the proposed project.

Yes. Several elevation surveys were conducted throughout the three tracts during proposed project development to support the hydraulic modeling of the wetlands and channels as well as the engineering design of new channels, filling ditches, the new berm and tide gates, and other elements. Site topography used for project design was based on the following data:

- 2002 topographic survey of all tracts using RTK GPS survey methods (Ducks Unlimited),
- 2009 LiDAR topography covering areas outside of and beyond ground survey limits (Oregon LiDAR Consortium),

- Supplemental ground survey, using RTK GPS survey methods, primarily within tract areas and bathymetric survey in Drift Creek and South Slough (Waterways Consulting in 2020),
- 2021 and 2022 ground survey focusing on floodplain areas and features to incorporate into the restoration design conducted by Wolf Water Resources using RTK GPS survey methods.

Comment 15: One comment expressed interest in understanding the process and variables used to evaluate the flood effects of the restoration.

To evaluate potential changes in flooding under the proposed restoration, three flood scenarios were developed as part of the hydraulic modeling, which simulates flows in the creek, varying tidal water levels on the downstream end, and resulting flows over the floodplains and wetlands.

The three flood scenarios were: the king tide, the 2-year flood, and the 100-year flood. These three flood scenarios represented a range of conditions with different severities and with different flood sources (i.e., tidal flood versus creek flood). These scenarios were analyzed as part of the hydraulic modeling.

The hydraulic model development followed standard engineering processes required by local jurisdictions including cities and counties, as well as the Federal Emergency Management Agency, to evaluate potential changes in flood water levels for projects located in floodplains. The model enables engineers to predict how water levels and flow velocities might be affected given changes such as new channels, lowered or removed dikes, etc.

Comment 16: Multiple comments asked how the proposed project will be evaluated before and after implementation and what monitoring will be conducted to understand the outcomes of the proposed project.

The Service and partners are developing a strategy to monitor the outcome of the proposed project from an ecological and biological standpoint. We plan to monitor salinity and temperature as a proxy for water quality. Water levels will also be monitored to provide information about the accuracy of the modeling, and to provide additional inputs into future modeling efforts. Plantings will be monitored for success and, if needed, will be replaced as needed. The target success rate is 80% survival after the first three years. Fish surveys will be conducted to determine fish species abundance (how many fish) and richness (how many species) use the new channels and floodplain. Additional details are provided in the Monitoring section of the EA.

Comment 17: One comment expressed concern about the uncertainty in the Service's response to questions about how the proposed project will affect neighboring properties.

The hydraulic modeling conducted for this proposed project indicates no negative impacts to private property based on the actions of the Service or our partners. For example, along Drift Creek, the proposed lowering/removal of the dike on the Shaffer Tract will generally encourage flows towards the restored floodplain (east side of the creek) and away from the neighboring properties on the west side of the creek – thereby resulting in no change or small reductions in hydraulic and flood risks to those neighboring properties.

Comment 18: One comment expressed concern in unreliable hydrologic model results because of unknown sediment dynamics.

We do not consider the hydraulic model results to be unreliable because of unknown sediment dynamics. While the specific values of simulated water levels or velocities reported thus far under a given hydrologic scenario might change if the bed conditions were different than those evaluated, we do not expect the nature of the results to change. In other words, we do not expect the model would begin to show increased water levels where it currently shows reduced water levels. The model results reported are relative to existing conditions, and in our experience, we do not expect restoration would result in worsened conditions relative to existing conditions even if creek bed conditions were to change as a result of normal (non-catastrophic) sediment transport processes.

In addition, modeling of the two-year flood scenario showed that the velocities and other hydraulics in Drift Creek are not expected to change significantly from existing to proposed conditions. This suggests that proposed restoration on the Shaffer Tract would not induce significant changes in sediment transport capacity in the creek in the vicinity of the dike removal/lowering. The transport of sediment and woody debris in the creek after restoration is expected to be like current regimes.

Comment 19: One comment suggested that the worst-case flooding scenario be modeled to help inform neighboring properties owners and the surrounding communities.

The current hydraulic model analyses included the 100-year event (1% annual chance event, or base flood) as a representation of a very extreme or rare event. The base flood is likely not the worst-case flood scenario, but results of this scenario are expected to be like a more extreme flood since nearly all the floodplain and adjacent properties are already inundated under the base flood. It is standard practice to use a 100-year scenario as the high base flood bounds and we believe the results of the 100-year scenario are adequate for informing neighbors and surrounding areas.

Comment 20: One comment asked how a large flood event may change the creek channels.

Channel bed elevations in Drift Creek begin to change through natural deposition and erosion likely around a 2-year flood event (included in the hydraulic model simulations), and become more extreme (e.g., large bank scour, overtopping the existing dikes near the residents on Drift Creek near the former log jam) during 5-year to 25-year flood events and above. The hydraulic

analysis does not include specific intermediate events between the 2-year and 100-year events, which is a very broad range; so, we did not specifically evaluate one of these representative events, and instead included "bookend" hydrologic scenarios – the results of which are expected to be between the 2-year and 100-year events as reported in the design and EA analyses discussed in the hydrology and floodplains section of the Environmental Consequences chapter.

National Environmental Policy Act (NEPA) Planning Process

Comment 21: Two comments expressed concern that there were not enough public meetings or opportunities for the public to review the plan and provide comments.

There were three meetings open to the public before the release of this EA. Notification about each meeting and the release of the EA was distributed via flyers to households near the proposed Drift Creek project area, a news release issued to local media, and the meetings were promoted on the social media platforms and websites for MidCoast Watersheds Council, Salmon Drift Creek Watersheds Council, and the Oregon Coast National Wildlife Refuge Complex.

Due to the COVID-19 pandemic, a virtual meeting was held for scoping the proposed project on March 6, 2021. Alternatives were developed by the design team and a second virtual meeting was held on July 13, 2021, to describe the modelling outcomes of each developed alternative. A third meeting was held on site for neighbors to ask questions and to view the proposed project area in person on October 2, 2021. At all three of these meetings, the public was given opportunities to ask questions and to contribute to the planning process. Public comments and concerns were considered in the proposed project design.

To reach out to the adjacent neighbors again, the Project Leader for the Oregon Coast Refuge Complex, Harry McQuillen, and Deputy Project Leader, Kate Iaquinto, conducted a door-to-door meet and greet with local neighbors on August 18, 2022. During the following weeks, we again attempted to meet additional landowners that had not been reached on August 18th.

Following the release of this EA, the Service sent letters to every landowner in the immediate area of the proposed project notifying them of the release and the 30-day public comment period. An open house was held on March 9, 2023, to introduce the public to the EA and answer questions and explain the public comment process. The intention of this open house was to distribute information from the EA and ensure that the public understood the public comment process. It was not intended as an opportunity for the Service to accept verbal public comments, although we did record the meeting and document all questions and comments shared during the open house. Maps and design drawings were available for viewing during the open house, online, and at the Newport headquarters of the Oregon Coast National Wildlife Refuge Complex office during the 30-day comment period.

Infrastructure

Comment 22: Two comments expressed concern about the surrounding road soil stability with the potential for large quantities of water moving along the roadways.

The long-term issues with erosion potential along Highway 101, Drift Creek Road, Hemlock Road, and Gorton Road do not change as a result of the proposed project according to the hydraulic modeling conducted. The general nature of changes associated with this proposed project nearest these roads (primarily Shaffer Tract restoration) is increased floodplain connection along the creek, which has the tendency to reduce erosion in the main creek channel and put more water more frequently onto the Shaffer Tract (away from the roads and homes on the other side of the creek).

Based on the hydraulic modelling conducted by Wolf Water Resources:

- At Highway 101: there are no changes in velocities when comparing existing and proposed conditions in the vicinity of the highway bridge. The slight velocity increase of less than 0.5 feet per second stops several hundred feet short of the highway bridge, and there is no perceptible change in hydraulics at the bridge.
- Along Gorton Road and Hemlock roads: the bank lowering occurs well downstream of Gorton Road and downstream of Hemlock roads such that there do not appear to be changes in velocities at these locations. The levee lowering somewhat close to Hemlock Road will have the tendency to allow more water onto the Shaffer Tract side and reduce water (inundation and/or velocities) on Hemlock Road when flows are high enough to impact that area.

Results during higher flows such as the 100-year event will be less pronounced than those described above for the 2-year event because there will be widespread inundation with 100-year water levels (elevation 14 to 16 feet NAVD88 and higher along Drift Creek) well above the elevations of the proposed levee lowering, which are in the 10 feet to 12 feet NAVD88 range.

Comment 23: Multiple comments expressed concern about constructing a fence between the Shaffer Tract and the adjacent private property. The concerns included the practicality and cost of constructing and maintaining a fence that may incur repetitive damage from debris carried by high water flow.

The Service has considered, and remains open to considering, options other than a physical fence. However, past options discussed and agreed upon between the Service and the landowner were not implemented, resulting in a continuation of unauthorized grazing on Refuge lands. The unauthorized cattle must be excluded from Refuge lands to comply with Service grazing policies and to protect the newly created and restored floodplain channels. Cattle foot traffic and grazing in freshly disturbed soil immediately after construction destroys cut and fill areas, fresh seeding, and increases water turbidity. Furthermore, fencing will protect

the new plantings from damage by cattle and eventually allow forage to grow that supports wildlife including elk that use Refuge lands on the Shaffer Tract.

Service personnel will check the restoration site and fencing on a regular basis and following every king tide to ensure the fence is in good shape and maintained. If a large tree or other significant debris are found along the fence in a way that endangers the integrity of the fence, it will be removed. The fence will be designed with shorter, break-away sections of wire in areas where large wood or other debris are more likely to build up so that if a portion of it is knocked down or otherwise damaged, that section of fence can be patched without having to replace the entire fence. Additionally, the installation of large woody debris throughout the floodplain will help to capture flood debris on Refuge lands where it will, in turn, increase floodplain roughness and provide better habitat for fish and wildlife like juvenile salmon that are known to use trees, stumps and other debris for shelter from predators, foraging, etc.

Comment 24: Two comments suggested that a 16-foot buffer be added between the existing ditch and dike on the Kangas Tract to aid in future maintenance and reduce erosion concerns.

We agree with this suggestion and will incorporate a buffer and access route into the final design plans between the proposed berm on the Kangas Tract and the existing ditch which parallels private property. This buffer area will be wide enough to accommodate access for maintenance equipment that may be used to clean out or maintain the ditch and culverts in the future as needed. Proposed access routes will be located on Service property and public road right of ways.

Comment 25: Two comments suggested that larger tide gates should be installed.

We agree with this comment and have increased the size of the culvert from what was identified in the designs at our public meeting for the final design. While the original sizing was based on the flow rate expected to pass through the culvert, a larger diameter will enable easier cleanout if the culvert becomes blocked due to beaver activities or other debris.

Comment 26: One comment expressed concern about damage to Gorton Road from heavy truck and equipment during the implementation of the proposed project.

Most of the traffic related to the construction on the Shaffer Tract would occur on Service lands. There will be some daily traffic of personal vehicles to the site, however heavy equipment will be transported to the site via trailer and will be kept on site throughout the construction. Heavy equipment will not be operating on Gorton Road. If damage is incurred on roads used to access any of the proposed project sites, we will work with Lincoln County Public Works or Oregon Department of Transportation to repair any damage caused as a result of the proposed project.

Comment 27: One comment expressed concern about the height of proposed berm on Kangas Tract in relation to Drift Creek Road and adjacent private property.

The berm height design (currently at elevation 12.0 feet NAVD88) was intended to be at least as high as the existing wall (which is approximately elevation 11.4 feet NAVD88) and as high as Drift Creek Road where the new berm ties into the road embankment. Raising the berm higher (than Drift Creek Road) would not provide additional benefits for flood risk reduction purposes because high water from either Siletz Bay (via Kangas Tract) or from Drift Creek that exceeded elevation 12 feet NAVD88 would overtop the road and flow onto the private property; essentially, the road elevation would be the low point in the surrounding ground elevations once the berm is constructed.

Wildlife and Vegetation

Comment 28: One comment asked how species will be impacted by the proposed project and if the proposed project is worthwhile for species.

The expected effects to species and habitats from the preferred alternative are evaluated in the Affected Environment and Environmental Consequences chapter. The Terrestrial Wildlife and Aquatic Species and Threatened and Endangered Species sections address the impacts to wildlife, native birds, and native fish. The restoration of historic hydrological conditions in the preferred alternative are expected to have beneficial effects for native wildlife. Post construction surveys for fish using the restored areas will be conducted to assess the effects of implementing this habitat restoration project and determine whether future modifications are needed to meet project goals.

Comment 29: One comment asked how unwanted species, such as mosquitos and nutria, will be managed.

Pre-construction adult and larval mosquito surveys were conducted on all tracts in 2020 and 2021. The survey results were incorporated into the design to drain pools that are currently holding water. We expect the design of the proposed project to alleviate the potential for future issues with mosquitoes at the site because water should drain from any low-lying areas. If, after the first rainy season and/or inundation periods, some soils have settled, and water may remain for some length of time in pools. If areas of standing water are found that remain for multiple, consecutive days, the Service can regrade to ensure drainage.

Nutria are found on several refuges of the Oregon Coast National Wildlife Refuge Complex including Siletz Bay. If, or when, nutria become a problem within the proposed project area, the Service will work with the Oregon Department of Fish and Wildlife, USDA Animal Damage Control, and other partners to actively control it.

Comment 30: Two comments highlighted the importance of the vegetation planting composition considering saltwater tolerant species because of the likelihood of increased saltwater intrusion with expected sea level rise.

The habitat mounds were designed to be approximately 0 to 2 feet higher than mean higher high water, which is about 7 to 8 feet NAVD88 depending on the tract. High marsh vegetation is

most productive and is most conducive to accretion through sediment deposition and organic matter build-up, and thus has the best chance of keeping up with or outpacing rising water levels.

Wetlands slowly accrete sediment over time. By restoring water to the floodplain at Drift Creek, sediment deposition will be restored. Over time the restored marsh will accrete sediments and rise. Whether this natural expected rise keeps pace with or outpaces sea-level rise is uncertain, but the design is intended to give the wetland its best chance of persisting.

Comment 31: Two comments discussed the importance of aquatic and estuarine ecosystems and species. The commentors suggested that aquatic vegetation, such as eelgrass, and native estuarine bivalves be considered in the restoration design.

We do not plan to plant eelgrass, propagate shellfish, or introduce any subtidal nearshore flora or fauna in the proposed project area. Restoring tidal inundation to the site and the floodplain is the priority for the proposed project. Once construction is complete, it will take time for the site to develop in terms of water depth, velocity, temperature, and turbidity. Once the channels within the proposed project site have reached a state of equilibrium, we will determine if the habitat created is favorable for these species. Based on the habitat that is the result of the restoration, we may see that eelgrass and shellfish both propagate themselves on the site. If we have favorable conditions but do not have eelgrass beds establishing themselves then restoration of eelgrass is something we may consider for future restoration efforts.

Eelgrass is an important part of the aquatic habitat providing shelter and oxygen for juvenile fish. Eelgrass or other subtidal nearshore flora will distribute naturally if the given habitat features allow. There is ample “seed source” in within Siletz Bay to allow natural distribution of native plant / animal species into the new channels (personal comment, Derek Faber, Oregon Department of Fish and Wildlife).

The Service does not currently have plans to introduce native bivalves to the channel system. One critical habitat component needed to establish shellfish is a hard substrate for the shellfish to grow on. This is not part of the proposed project and therefor suitable habitat most likely will not be present.

In naturally occurring tidal channels in this area, gravel does not accumulate naturally. The bottom sediments are composed mostly of mud and sand. Fine sediment or mud to course sandy material is what would be there and will accumulate after a couple years post work (personal communication, Derek Faber, ODFW).

Comment 32: One comment expressed concern about the effect of increased saltwater intrusion killing marsh vegetation causing the marsh to sink.

The Service will be installing a data logger to measure conductivity as a proxy for salinity near the 12-foot Oregon Department of Transportation (ODOT) culvert under Highway 101. It will be installed during 2023, to capture pre-construction data and will continue to collect data after

the proposed construction on the Kangas Tract in 2024. We do not expect the design in this proposed project to increase water into the Kangas Tract or to change the salinity of the water. Water levels will only increase in the Kangas Tract if changes are made to the 3-foot, dilapidated culvert on private property that is downstream from the 12-foot ODOT box-culvert. This culvert is described on page 6 of the EA.

The reed canarygrass scrape-down areas will be exposed to salt water at higher tides, and that exposure should help to reduce, eradicate, or control the grass from the Kangas Tract. Additional methods to treat reed canarygrass may be employed as part of the Refuge's Integrated Pest Management Program (569 FW 1) if the scraping down reed canarygrass areas proves unsuccessful. That does not mean the marsh will sink (i.e., subside), which is usually caused by the exposure of peat soils to the air (e.g., after tilling). If reed canarygrass is controlled or eradicated, it would be replaced by native, salt tolerant, vegetation that would have historically been present on the site.

Hydrology and Soil

Comment 33: One comment expressed concern about erosion on the proposed project site before plantings and vegetation have a chance to take hold.

Two phases of seeding are planned for erosion control: one immediately after construction, and a second closer to the wet season. Native plant species commonly used in restoration that quickly establish and stabilize soil will be selected to decrease the time that bare soil is exposed on the proposed project site after construction. Seeding will be at or above the recommended seeding rate.

Shrubs and trees will be planted with the goal of achieving 80% survival within three years. Funding is available to monitor the status of the plants and for replanting, as needed, to achieve the desired survival rate. Larger individual plants will be selected to increase habitat quality and to prevent large woody debris from crossing the site and damaging the boundary fence.

Comment 34: One comment questioned the validity of creating new hydrologic features where those features may not have been located historically.

The channel designs are based on historic aerial photographs and existing elevations, where practical. Changes from the actual historic channel locations are needed at some locations to accommodate Refuge boundaries or topographical features that have changed since the historic images were taken. Additionally, the hydraulic modeling accounts for the features in terms of their size, location, elevation, etc. (i.e., the cut and fill is balanced – meaning we are not importing fill onto the floodplain, we are simply rearranging its configuration to replicate more closely what occurred naturally before the floodplains were modified by diking and draining). Thus, the designs have been careful to emulate if not follow historical locations and

are otherwise considered hydro-geomorphically appropriate in their size (width), length, and location within the wetlands.

Comment 35: Two comments expressed concern about the buildup of carbon in Refuge soils due to the lack of grazing.

All soil and plants contain carbon. While some carbon may be released during the earthmoving phase of the proposed project, a restored tidal marsh will ultimately sequester more carbon (nearly ten times more) than nearly any other known ecosystem, including mature tropical rain forests (NOAA 2023). Therefore, any concern about the potential loss of carbon is readily offset by the order of magnitude or more carbon that will be sequestered, in perpetuity, through the implementation of the proposed project. With regards to grazing, there is no grazing on the Kangas Tract or the Watson Tract, and the grazing that is occurring on the Shaffer Tract is unauthorized cattle grazing. Once a fence is installed to exclude cattle and vegetation grows, there will be an increase in carbon sequestration on that site.

Comment 36: Two comments expressed concern that the removal of the dike will increase erosion causing damage.

Removal of the degraded dike along the edge of the Shaffer and Watson Tracts is not expected to cause long-term erosion due to the percent slope of the site, the re-seeding of all disturbed areas of soil, the exclusion of unauthorized cattle grazing on Refuge lands, and the nature of the water flow on the site (i.e., the water sheet flows across a low gradient site; they are not scouring flows that carve channels across the floodplain). The edge of the property where the dike is being removed, will experience a slight increase in water turbidity during the actual earth moving and until the finer soil particles settle out and the new seeding takes root. Over time, the restored tidal marsh and floodplain habitat will filter sediment from incoming water and tides, thereby helping the marsh elevation to keep up with sea level rise. Removal of the dike may lead to less erosion on the far side of Drift Creek because water that had formerly remained in the creek channel, will be able to flow over the floodplain and away from the east side of the creek where homes and other infrastructure are present.

Comment 37: One comment expressed concern that the proposed channel on the Shaffer Tract is larger and different than historic tidal channels that contained a tidal network with various tertiary channels. The commentor is concerned that this larger channel will cause erosion.

The wetland channel designs are based on historical reference marshes at Millport Slough and other west coast wetlands. The sizes (widths), lengths, locations, and channel densities for the channels, particularly those on Shaffer Tract, are within the ranges of size and other metrics found at reference sites. Historically, the primary wetland channel into the Shaffer Tract connected farther to the east (off USFWS property); however, we anticipated no adverse impacts to the natural functions of the wetland or to the adjacent private property due to the size and depth of the proposed channel on the Shaffer Tract. Flows that enter the new Shaffer

Tract channel will be relatively low energy (decreasing energy with distance north of South Slough). We expect that the environment along this Shaffer Tract channel will be depositional in nature, rather than erosional. The most important factor influencing the rate of sediment deposition will likely be the success of the native vegetation along the margins of this channel – which will be managed and maintained by the Service.

Construction

Comment 38: Two comments emphasized the importance of using equipment and techniques that reduce soil compaction during construction.

We intend to use heavy equipment with wide tracks and excavator mats, when needed, to reduce soil compaction. Any areas that appear to be heavily compacted can be tilled as part of the final grading and restoration of the site, travel routes, staging areas, etc.

Comment 39: One comment asked how long the construction would take and if the construction would affect the Alder Island parking lot or hiking trail.

Work on the proposed project in 2023 is expected to take approximately six weeks during August and September. We do not expect any impact to the Alder Island parking area or hiking trail.

Other

Comment 40: Two comments expressed concern about if damage occurred to their property how the Service would handle the situation.

This proposed project is being designed specifically to avoid damage to private or county property. However, the Service remains liable for damages to other's property to the extent provided by federal law.

Comment 41: One comment emphasized the importance of collaborating with neighboring landowners on management of the landscape.

We agree that cooperating with neighboring landowners is crucial to our success in the proposed project. We have been communicating and will continue to communicate with them regularly regarding the proposed project and other actions occurring on Refuge lands.

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