

# Chapter 2 Management Direction



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## Chapter 2. Management Direction

### 2.1 Overview

During development of this CCP, the Service reviewed and considered a variety of local and regional physical and biological resource conditions, as well as social, economic, and organizational aspects important for managing the Refuge. This background information is described more fully in Chapters 3, 4, and 5. As is appropriate for a national wildlife refuge, natural resource considerations were fundamental in designing alternatives. House Report 105-106 accompanying the National Wildlife Refuge System Improvement Act of 1997 (Public Law 105-57) states "...the fundamental mission of our System is wildlife conservation: wildlife and wildlife conservation must come first." Toward this end, the refuge planning team reviewed scientific reports and studies to better understand ecosystem trends and the latest scientific recommendations for species and habitats.

Public involvement was an important part of the planning process. Local, State, and Federal agencies, Tribes, and elected officials were contacted by the Refuge Complex planning team to ascertain priorities and problems as perceived by others. In addition to holding a public scoping meeting to explain the process and accept comments and suggestions, the team contacted refuge users, nonprofit groups, and community organizations to ensure their comments and ideas were considered during the development of alternatives. The planning team then developed preliminary management concepts and strategies, which they presented to the public in a planning update and at a public meeting in fall 2011. Based on all of the information gathered and feedback from others through the public involvement process, the Service developed three draft alternatives for the Draft Comprehensive Conservation Plan and Environmental Assessment (Draft CCP/EA) for Nestucca Bay National Wildlife Refuge (USFWS 2012a), which was released in September 2012. Alternative C was selected as the preferred alternative.

The CCP planning team reviewed and evaluated all of the comments received during the 30-day Draft CCP/EA comment period. Alternative C within the Draft CCP/EA was selected for implementation. In some cases, the management direction has been either clarified or modified based upon public feedback. The details of public participation can be found in Appendix J, Public Involvement, and Table L-2 within Appendix K, Comments Received during Public/Agency Review Period and Service Responses, shows the major changes between the draft and the final CCP.

### 2.2 Management Directions Considered but Not Developed

Early in the alternatives development process, the planning team considered including the following actions in one or more CCP alternatives. These actions were ultimately eliminated from further consideration in this CCP for the reasons provided.

**New Trails, Observation Decks, and a Road in Sensitive Areas.** Several trails, observation decks and a road that were requested by the public during scoping could not be considered for development due to the high likelihood of impacts to sensitive fish, wildlife, and plant species and negative effects to marsh hydrology. The Service was initially asked to consider the development of an elevated boardwalk trail to replace the existing tsunami evacuation trail through Neskowin Marsh since this trail often floods in the winter months. The primary use of the trail is as a tsunami evacuation trail, although it is also used daily by local residents to travel between Neskowin Crest and other parts of

the community including the beach. Development of this trail into an elevated boardwalk to serve the public for wildlife-oriented recreation purposes has physical limitations within the community of Neskowin including very narrow streets, a lack of parking, and the community preference against inviting public use through town. These limitations led to the decision to eliminate from further consideration the replacement of the tsunami evacuation trail with an elevated boardwalk for use by the general public.

A request was made to the Service by local residents and the Tillamook County Board of Commissioners to convert the tsunami evacuation trail into a one-lane road for vehicles to use during an evacuation. Allowing a road to be constructed on the Refuge for this purpose would not be an appropriate use. Constructing a road would necessitate removal of riparian vegetation and construction of a bridge would be necessary to meet ODFW and NOAA Fisheries fish passage requirements for threatened coho salmon. The placement of additional fill material or rock on the existing trail would further impound high flows resulting in more extensive flooding affecting Hawk Street, adjacent low-lying homes and negatively impacting marsh hydrology. For these reasons, converting the tsunami evacuation trail to a road was eliminated from further consideration. Other trails through Neskowin Marsh, including a trail north of the existing tsunami evacuation trail, would traverse rare bog habitat and would necessitate major construction and disruption of the hydrology of the marsh and would impact rare plants; therefore, new trails through Neskowin Marsh were not developed as alternatives.

**Restoration of all Pastures to Tidal Marsh.** The National Wildlife Refuge System Administration Act of 1966, as amended, requires management of units of the Refuge System to be consistent with individual refuge purposes and the mission of the System. The System mission 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.” We believe that over the long term, restoration of some lowland pastures on refuge lands within Nestucca Bay NWR to a naturally functioning tidal marsh may be desirable; however, for the life of this plan (15 years) we believe that restoration would not best serve current conservation objectives.

The Nestucca Bay NWR was established in 1991 to conserve fish, wildlife, and plants which are listed as endangered or threatened species; for migratory birds; and for conservation of wetlands. The Refuge protects and provides high quality forage and sanctuary for wintering geese and other migratory birds. The diked marshes and lowland pastures are managed intensively for six subspecies of white-cheeked geese, with particular emphasis placed on dusky Canada and Aleutian Canada geese. When the Refuge was established in 1991, the Aleutian Canada goose had been listed as endangered since 1967. It was downgraded to threatened in 1990 and was removed from the Federal Endangered Species List in 2001. Establishing legislation for the Refuge included the Endangered Species Act, and the Service’s intent in acquiring the lowland pastures was to manage them to continue providing quality wintering forage and sanctuary for these geese. The Nestucca Bay area is also the only known wintering area for the declining dusky Canada geese on the Oregon coast. The Refuge is cited in the Pacific Flyway Dusky Management Plan as providing important wintering habitat for duskys (PFC 2008). Up to 18% of the entire dusky Canada goose population is supported by refuge pastures on an annual basis during the winter period (Stephensen and Horton 2011). In addition, refuge pastures support up to 100% of the unique Semidi Islands Aleutian Canada goose population.

The Refuge was established with the objective of managing to protect wintering goose habitat in the Nestucca Bay area while recognizing the importance of the dairy industry in meeting that objective. Since establishment, refuge managers have worked with local dairy farmers to maintain short grass habitats (pastures) around Nestucca Bay to benefit geese and other wildlife. Dikes and tide gates have been maintained to protect the lowland pastures from flooding. Of the Refuge's 1,010 acres, 346 acres are actively managed as pasture habitat for geese and other waterfowl. Because they are historic tidal marsh, the lowland pasture soils are poorly drained, fine-textured, and very strongly acidic, which limits the plant species that can successfully grow in the pastures. The pastures are level or lower than the estuary water table and the soils are waterlogged during the wet season of October through April. The low elevation of the fields causes the water levels to rise following periods of heavy rain, sometimes quite rapidly. The pastures currently function as wet meadow/seasonal wetlands.

The Aleutian Canada goose was removed from protection under the Endangered Species Act in 2001 and the population had expanded to approximately 112,000 birds by the winter of 2011 (USFWS 2011c), resulting in crop damage complaints from farmers in wintering and migration areas including Nestucca Bay. In recent years, a large increase in the number of Aleutian Canada, lesser Canada and Taverner's Canada geese wintering in the Nestucca Bay area has greatly intensified goose damage concerns to area dairy operations. Area dairy farmers often haze geese from their pastures particularly in late-winter and spring, in order to protect the grass forage for their dairy cows. The spring growth of new grass is particularly important to local dairy operations. In order to reduce the incidence of disturbance to dusky Canada geese through hazing and other methods, and to minimize goose depredation on neighboring privately owned pastures, the Refuge's intent has continued to be the attraction and maintenance of wintering geese, especially dusky Canada geese, on refuge pastures. Restoration of all refuge pastures to tidal marsh at this time would eliminate this habitat and place the full burden of providing goose forage on private dairy farmers.

Tidal marsh habitat at Nestucca Bay has declined by 91 percent (Brophy 2011), and other Oregon estuaries have experienced similar losses. Tidal marsh habitat is unequivocally acknowledged as extremely important for many species of fish and wildlife as well as overall health of an estuary. In 2007, an 82-acre parcel of Nestucca Bay NWR was restored to tidal marsh. This area formerly consisted of five private parcels that previously served as diked pasture, but had been allowed to revert to muted tidal conditions for 15-20 years before refuge acquisition. The restoration project involved removing a 0.7-mile dike, placing 23 complexes of large woody debris (LWD), re-establishing or restoring 2 miles of tidal channel, and removing two tide gates to provide fish passage to 1.5 miles of tidal channel. The project benefited juvenile salmonids, including spring and fall Chinook, chum, and coho salmon and steelhead and cutthroat trout, by providing rearing habitat.

The Service acknowledges that the decision not to consider full restoration of pastures to tidal marsh at this time is based on planning for the next 15 years and not the foreseeable future. Climate change and sea level rise will be of increasing importance in setting management direction for all low-lying lands and waters within the Refuge. According to sea level rise modeling under a scenario of no further raising of dikes, the majority of the lowland pasture units of the Refuge would likely be at least partially inundated by sea level rise at some time during this century (So et al. 2011). As this happens, maintenance of dikes and water control structures to keep tidal action out of the pastures would become increasingly expensive and unsustainable, and the pastures would gradually return to tidal marsh whether or not the Service undertakes an active restoration program. However, because of our previous agreement with landowners, our continuing desire to manage for a variety of habitats, and the ongoing need for this protected wintering habitat in the Nestucca Bay area, particularly for

dusky Canada geese, for the life of this 15-year management plan the Service did not develop the alternative of restoring all lowland pastures to tidal marsh.

## 2.3 Description of Management Direction

A brief description of the management direction follows. Table 2-1 contains additional details regarding actions associated with the CCP. A map displaying management direction for the Refuge is located at the end of this chapter (Figure 2-1).

**Wildlife and Habitat Management.** Refuge management will continue to emphasize protecting and maintaining lowland pasture, estuarine, coastal bog, stream-riparian, and forested habitats. All lowland pastures will continue to be managed for wintering goose habitat through cooperative farming agreements with local farmers. Additional active habitat management, monitoring, and restoration will also be implemented. The 25-acre restoration of former coastal prairie on Cannery Hill will be focused on specific life-history parameters needed by the threatened Oregon silverspot butterfly, with the goal of introducing a nonessential experimental population once habitat parameters specified in the Oregon Silverspot Butterfly Recovery Plan are achieved. An additional 14 acres of upland grassland will also be restored to coastal prairie. In addition to allowing natural processes to drive vegetative changes, techniques such as thinning, girdling, and falling will be used to promote the development of late-successional characteristics within 214 acres of existing forest. A hydrological study will be conducted and used to guide the modification of the tsunami evacuation route through Neskowin Marsh to improve hydrology and accessibility. The Neskowin Marsh Unit will be proposed for designation as a Research Natural Area (RNA).

**Public Use Management.** Wildlife observation and photography will be enhanced by the development of new trails at Cannery Hill and the Little Nestucca Restoration area. An accessible path will provide a safe route around the lower parking lot to the new goose observation deck on Cannery Hill, and a gravel parking lot will be created on the west end of the Little Nestucca Restoration area. Wildlife observation and photography will be allowed year-round on Brooten Marsh.

A waterfowl hunting program will be established on Brooten Marsh (108 acres) and the mouth of the Little Nestucca River (33 acres) and clamming access will be allowed through Brooten Marsh. Bank fishing will be allowed on the east end of the Little Nestucca Restoration Area following the development of an access trail and gravel parking lot.

Environmental education efforts will be expanded through use of the Nature Discovery Backpack program, other partner-driven programs, and hiring of additional staff and volunteers. Interpretive signs and materials will be developed and installed in conjunction with new trails at Cannery Hill and the Little Nestucca Restoration Area.

To accommodate increasing visitation to the Refuge, the current refuge volunteer residence will be replaced with a bunkhouse and small administrative office. The Service will also remodel the north bay of the maintenance shop to accommodate two offices: one for maintenance staff and a second for the refuge Friends Group.

**Adaptive Management.** Adaptive management is a management philosophy and decision process that incorporates flexibility and continual learning. It involves monitoring and evaluation of refuge accomplishments, comparing accomplishments to objectives, and changing management strategies or

objectives as necessary to achieve desired results. In the presence of accelerated climate change, adaptive management is an increasingly important management-decision process. The Refuge will employ adaptive management as a standard operating procedure.

**Appropriateness and Compatibility.** Consistent with relevant laws, regulations, and policies, prior to allowing any public use of the Refuge (including commercial use), each use will first need to be found appropriate and determined compatible (16 U.S.C. 668dd-668ee, 50 CFR 25, 26, and 29; and 603 FW 1 and 2). In the Draft CCP/EA, the Service made preliminary findings and determinations regarding the appropriateness and compatibility of each use included in each alternative. Appropriateness findings and compatibility determinations have been finalized for each use included in the Service's management direction. Appropriateness and compatibility are further discussed in Appendices A and B.

**Climate Change.** As stated in the Department of the Interior's Secretarial Order 3226 and the Service's Climate Change Strategic Plan (USFWS 2010a), the Service considers and analyzes climate change in its decisions, long-range plans and other activities. Habitat conditions and wildlife populations are directly and indirectly sensitive to climatic conditions, namely precipitation and temperature and changes to hydrologic conditions, sea level rise, and ocean acidification. As described in greater detail in Chapter 3, the Refuge is potentially affected by sea level rise in spite of upward vertical land movement and estimated sediment and vegetative accretion rates. The Refuge may be also be affected by storm surges, increases in extreme precipitation events, higher water temperatures, and ocean acidification.

The combined changes can affect the Refuge's habitats and species directly, such as the timing of arrival of migratory birds and many other phenologic responses, changes in species' ranges and physiology, and indirectly such as added vulnerability to other stressors including increasing invasive species and pathogens. Predicting biological response at the population level, however, requires complex research and information and sophisticated models that can be validated with field studies over time. This highlights the importance of monitoring habitat and species to establish potential correlations and adaptation options.

Knowledge and monitoring of regional and local climate trends on refuge resources will be used to assess potential changes or enhancements to the Refuge's management actions and techniques and/or their timing, using the adaptive management approach described above.

The Refuge Complex staff will participate in and contribute to climate change and sea level rise assessment efforts, including those underway at a landscape scale. Participation in the North Pacific Coast Landscape Conservation Cooperative (LCC) will provide refuge staff with a means to tie in with a larger scale assessment of the impacts of climate change (USFWS 2010a). LCCs are formal science-management partnerships between the Service, Federal agencies, states, tribes, non-government organizations (NGOs), universities, and other entities to address climate change and other biological stressors in an integrated fashion. LCCs provide science support, biological planning, conservation design, research, and design of inventory and monitoring programs.

As needed, objectives and strategies will be adjusted to assist in enhancing the resiliency of refuge resources to climate change. Specific management goals, objectives and strategies, based on climate change impact projections, will be identified for refuge habitats most vulnerable to climate change and sea level rise.

The Service has developed a Strategic Plan for Responding to Accelerating Climate Change in the 21st Century (USFWS 2010a), and an Action Plan outlining specific actions needed to implement the Strategic Plan. The Action Plan calls for the Service to make its operations carbon-neutral by 2020. The Refuge will work toward this goal by continuing to pursue and engage in mechanisms to conserve energy in refuge operations, including the use of fuel-efficient vehicles and building appropriately sized, energy-efficient facilities, as funding becomes available. The Refuge will also reduce the carbon footprint of land management activities by using energy-efficient techniques, where feasible and in line with management goals. The Refuge will also continue to explore ways of offsetting any remaining carbon balance through carbon sequestration such as reforesting a portion of Cannery Hill, which began a decade ago.

**Cultural Resources Protection.** The Service will continue to uphold Federal laws protecting cultural resources, including the National Historic Preservation Act (NHPA), Archaeological Resources Protection Act (ARPA), and Native American Graves Protection and Repatriation Act (NAGPRA). These laws also mandate consultation with Native American tribes, the State Historic Preservation Office (SHPO), and other preservation partners. The NHPA mandates that all projects that use Federal funding, permitting, or licensing be reviewed by a cultural resource professional to determine if there is the potential to affect cultural resources. An inventory will be conducted as necessary, and appropriate actions to mitigate effects will be identified prior to implementation of the project. A project-specific determination will be conducted for all undertakings as defined by NHPA, including habitat maintenance and restoration projects as well as new or expanded trails, roads, facilities, and public use areas.

**Fire Management.** The overall objective for fire management on the Complex is to promote a program that provides for firefighter and public safety, reduces the occurrence of human-caused wildfires, and ensures appropriate suppression response capability to meet expected wildland fire complexity. Fire Management Plans (FMPs) were completed for the entire Complex, including Nestucca Bay Refuge, in 2004. The FMP details response to the threat of wildfire and under what circumstances the refuges will use wildland fire as a tool on refuge lands.

**Implementation Subject to Funding Availability.** Actions described in this CCP will be implemented over the life of the plan as funding becomes available. Project priorities and projected staffing/funding needs are included in Appendix C.

**Integrated Pest Management (IPM).** In accordance with 517 Departmental Manual (DM) 1 and 569 Fish and Wildlife Service Manual (FW) 1, an integrated pest management (IPM) approach will be utilized, where practicable, to eradicate, control, or contain pest and invasive species (herein collectively referred to as pests) on refuge lands. IPM will involve using methods based upon effectiveness, cost, and minimal ecological disruption, which considers minimum potential effects to non-target species and the refuge environment. Pesticides may be used where physical, cultural, and biological methods or combinations thereof, are impractical or incapable of providing adequate control, eradication, or containment. If a pesticide is needed on refuge lands, the most specific (selective) chemical available for the target species will be used unless considerations of persistence or other environmental and/or biotic hazards would preclude it. In accordance with 517 DM 1, pesticide usage will be further restricted because only pesticides registered with the U.S. Environmental Protection Agency (USEPA) in full compliance with the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and as provided in regulations, orders, or permits issued by USEPA may be applied on lands and waters under refuge jurisdiction.

Appendix G contains the Refuge's IPM program documentation to manage pests for this CCP. Along with a more detailed discussion of IPM techniques, this documentation describes the selective use of pesticides for pest management on refuge lands, where necessary. Throughout the life of the CCP, most proposed pesticide uses on refuge lands will be evaluated for potential effects to refuge biological resources and environmental quality. These potential effects will be documented in "Chemical Profiles" (see Appendix G). Pesticide uses with appropriate and practical best management practices (BMPs) for habitat management as well as facilities maintenance will be approved for use on refuge lands where there likely would be only minor, temporary, and localized effects to species and environmental quality based upon non-exceedance of threshold values in Chemical Profiles. However, pesticides may be used on refuge lands where substantial effects to species and the environment are possible (exceed threshold values) in order to protect human health and safety (e.g., mosquito-borne disease).

Because invasive plants and animals currently represent the greatest threat to the Refuge's wildlife and habitat, control of invasive species will be a high priority management activity. Invasive species such as Scotch broom, Himalayan blackberry and reed canarygrass will continue to be a primary management concern and will be controlled to the degree that funding permits. Invasive species control will be initiated prior to or concurrently with all habitat restoration efforts.

The magnitude of pest problems on the Refuge is beyond the available capital resources to expect control or eradication during any single field season; therefore it is essential to prioritize treatment of infestations. Some non-native species which are pervasive on refuge lands are the subject of long-term control efforts and will continue to be a high priority. Also, the Service will find and verify the identity of new invasive species as early after entry as possible, when eradication and control are still feasible and less costly. Regardless of whether the invasive species is well established or newly introduced, the Refuge will prioritize pre- and post-treatment monitoring, assessment of the successes and failures of treatments and development of new approaches when proposed methods do not achieve desired outcomes.

**Land Protection.** The Service has the authority to acquire land or negotiate agreements on behalf of the National Wildlife Refuge System only within an approved refuge boundary. The Service can make offers to purchase land, purchase conservation easements, or enter into management agreements with willing landowners within the approved boundary. Lands or interests therein do not become part of the National Wildlife Refuge System unless they are purchased from or are placed under a management agreement with the individual landowner. Service authority over any use of lands within an approved refuge boundary is limited to lands the Service has acquired in fee title, conservation easement, or entered into a management agreement. Private landowners within an approved refuge boundary retain all of the rights, privileges, and responsibilities of private land ownership and are under no obligation to sell their property to the Service. Service policy for land acquisition is to work on a one-on-one basis with a willing seller/interested landowner. Based on the availability of funds, the Service will continue to negotiate with willing sellers to acquire lands within the existing approved refuge boundary.

**Maintenance of Existing Facilities.** Periodic maintenance of refuge buildings and facilities will be necessary. Periodic maintenance and upgrading of facilities is necessary for safety and accessibility and to support management and visitor needs, and is incorporated in the Service Asset Management System.

**Regulatory Compliance.** Prior to implementation, all planned activities will undergo appropriate reviews and consultations, and permits and clearances will be secured, as necessary, to comply with legal and policy requirements. This includes water quality permits required under Section 401, and dredge and fill permits required under Section 404 of the Federal Water Pollution Control Act of 1982, as amended (33 U.S.C. 1251-1382); appropriate evaluations and documentation under the National Environmental Policy Act; and, as noted above, evaluation and consultation required by Section 7 of the Endangered Species Act, and review and consultation required by Section 106 of the National Historic Preservation Act.

**Response to Mosquito-borne Diseases.** Under draft refuge policy (72 Federal Register 71939), mosquito populations on refuge lands are allowed to fluctuate and function unimpeded unless they pose a threat to wildlife and/or human health. While the Service recognizes that mosquitoes are a natural component of most wetland ecosystems which provide food for some fish and wildlife including migratory birds, we also recognize they can be a nuisance and may represent a threat to human and/or wildlife health. To protect human and wildlife health and safety, the state or a local vector control agency would be allowed to control mosquito populations on refuge lands using pesticide treatments (larvicides, pupacides, or adulticides) only if local, current population monitoring and/or disease surveillance data indicate refuge-based mosquitoes pose a health threat to humans and/or wildlife. As previously described, mosquito treatments would be allowed on refuge lands in accordance with IPM principles applicable to all pests (see Appendix G). Proposed pesticide uses for mosquito control will utilize appropriate and practical BMPs, where possible, given potential effects documented in Chemical Profiles. If mosquitoes are determined to be posing a threat to wildlife and/or human health, a refuge compatibility determination (CD) will be written, which will provide details regarding mosquito population monitoring, disease surveillance, and treatments.

A disease contingency plan (DCP) will be prepared addressing response to mosquito-borne disease outbreaks on and/or adjacent to refuge lands. Much of the information will be evaluated and described in the previously mentioned CD (e.g., IPM treatment options) and will be incorporated with additional specificity, where necessary, into this plan. The DCP also will include other information such as the history of mosquito-borne diseases on and/or adjacent to the Refuge as well as measures to protect refuge visitors, Service-authorized agents, and Service employees when a health threat or emergency is identified by health officials.

**Participation in Regional Planning and Conservation Efforts.** The Refuge Complex staff will actively participate in and contribute to planning and conservation efforts for ongoing and future monitoring and research associated with tidal marsh restoration, invasive species detection and rapid response, and other activities that may affect refuge wildlife resources and habitats. Refuge Complex staff will cultivate working relationships with pertinent local, county, State, and Federal agencies to stay abreast of current and potential developments; and will utilize outreach, education, and information as needed to raise awareness of refuge resources and their dependence on a healthy local environment.

**Partnerships.** Partnerships on the Refuge are critical components in maintaining and continuing efforts to enhance recreation opportunities or implement resource management improvements, such as restoring habitat for threatened and endangered species. These partnerships typically involve joining forces with Federal, state, and local agencies and organizations. The Service will continue to devote time and effort towards maintaining existing and developing new partnerships to enhance collaboration on support of fish and wildlife resources, wildlife-dependent recreational opportunities, and educational programs, and to explore ways to share funding and seek grants on projects of

mutual interest. Specifically, the Service will work with local and state agencies to promote mutual understanding, encourage environmentally friendly development, and promote eco-tourism opportunities.

**Refuge Revenue Sharing.** Annual payments to Tillamook County under the Refuge Revenue Sharing Act (16 U.S.C. 715s) will continue according to the established formula and subject to congressional appropriations.

**State Coordination.** The Refuge Complex will continue to coordinate with Oregon State agencies regarding areas of mutual interest. This includes communications with ODFW regarding public recreation, fish passage, and habitat restoration and management priorities identified through the Oregon Conservation Strategy.

**Tribal Coordination.** The Service will coordinate and consult with Native American Tribes on a regular basis regarding issues of shared interest. Currently the Service seeks assistance from Tribes in Native American Graves Protection and Repatriation Act and National Historic Preservation Act and related issues. The Service is also interested in partnering with Tribes to provide cultural resources education and interpretation opportunities.

**Volunteer Opportunities and Partnerships.** Volunteer opportunities and partnerships are recognized as key components of the successful management of public lands and vital to implementation of refuge programs, plans, and projects.

**Wilderness Review.** The Service’s CCP policy requires that a wilderness review be completed for all CCPs. If it is determined that the potential for wilderness designation is found, the process moves on to the wilderness study phase. As part of the process for this CCP, the planning team completed a wilderness review which can be found in Appendix D. This review concluded that the Refuge is not suitable for wilderness designation

**Table 2-1. Summary of Management Direction**

Key Theme/issue	Future Management
<b>Grasslands</b>	
Pasture management	346 acres managed as pasture. Continue to manage and maintain pastures through Cooperative Land Management Agreements (CLMAs), including grazing and silaging fields, fertilizing, weed control, and maintaining fences and ditches. Evaluate and monitor water quality, control nuisance mammals where necessary to protect dikes and ditches.
Upland coastal prairie restoration	Restore up to 25 acres of native prairie by 2028 through a phased restoration project. Methods include control of non-native plants, removal of encroaching woody plants, seeding and planting of native prairie grasses and forbs, and periodic disturbance to maintain restored habitat. Focus is on habitat parameters necessary to support introduction of nonessential, experimental population of threatened Oregon silverspot butterfly.
Mixed upland grasslands	14 acres maintained and managed until restoration to upland coastal prairie is funded. Techniques will include targeted control of reed canarygrass, mowing and silage, and mechanical removal of encroaching woody species.
<b>Forest</b>	
Sitka spruce-western hemlock forest	214 acres actively managed. Continue control of invasive species. Use appropriate forest management techniques to thin trees where needed.

**Table 2-1. Summary of Management Direction**

Key Theme/issue	Future Management
<b>Wetland Habitats</b>	
Salt marsh	208 acres protected and maintained. Monitor and control invasive species using appropriate IPM techniques. Monitor salmonid use. Outplanting of rare, native species (e.g., Henderson’s checkermallow) to increase native vegetation presence.
Intertidal mudflat	19 acres protected. Monitor for invasive and nuisance species and utilize appropriate IPM techniques to control. Work with Oregon Department of State Lands to cooperatively manage resources and treat/monitor invasive species.
Forested lagg – Neskowin Marsh	61 acres protected. Monitor for invasive and nuisance species and utilize appropriate IPM techniques to control. Designate as RNA.
Coastal bog – Neskowin Marsh	70 acres protected with additional site-specific monitoring. Monitor and control invasive species using IPM techniques. Conduct additional monitoring of water quality for off-site contaminants. Conduct plot-based sampling for swamp loosestrife. Designate as RNA.
Freshwater emergent wetland – Neskowin Marsh	33 acres protected and maintained. Monitor for invasive and nuisance species and utilize IPM techniques to control. Monitor water quality. Conduct hydrological study to assess management options. Designate as RNA.
Neskowin Marsh tsunami evacuation trail	Keep tsunami evacuation trail open. Conduct a hydrologic study. Modify footbridge to enhance safety and accessibility. Modify trail and footbridge to enhance hydrologic connectivity based on results of hydrologic study. Mark trail with tsunami evacuation signs. Vegetation management will be conducted. The Service acknowledges that the trail floods annually following heavy rainfall, as does the adjacent Hawk Road that leads to the trail. The Service will install reflective markers on both sides of the trail to outline the trail route during flooding or at night.
Forested wetlands and stream-riparian habitat (wet-mesic Sitka spruce-western hemlock forest)	6 acres of forested wetlands and stream-riparian habitat protected and maintained. Continue invasive species control.
<b>Wildlife – Listed Species</b>	
Oregon silverspot butterfly	1 experimental population introduced. Continue establishment and maintenance of life cycle habitat parameters (larval host plants and adult nectar plants) for listed Oregon silverspot butterfly (OSB). Following coastal prairie restoration and successful establishment of high-quality OSB habitat, introduce a nonessential experimental population of OSB onto restored prairie.
<b>Monitoring and Research</b>	
Status monitoring	Continue current status monitoring and collect additional data on fish, amphibians, small mammals, plants, migratory songbirds, soil accretion, water levels, forest diseases, and pests.
Effectiveness monitoring	Monitor CCP and other step-down plan objectives. Conduct long-term monitoring associated with the effectiveness of salt marsh restoration projects including salmonid use, vegetation response, and water quality parameters.
Research and scientific assessments	Identify priority research needs and cooperate with partners to accomplish. Conduct hydrological assessment at Neskowin Marsh. Nominate Neskowin Marsh as an RNA.

**Table 2-1. Summary of Management Direction**

Key Theme/issue	Future Management
<b>Wildlife Observation and Photography</b>	
Cannery Hill Unit	Trail and parking lots at Cannery Hill remain open. Develop Powerline Trail, a new loop trail, “Discovery Trail,” and goose observation deck in the lower parking lot.
Little Nestucca Restoration Area	Develop north end of old roadbed into spur road trail to an observation point and allow year-round public access on this trail. Create gravel parking lot on west end of restoration site.
Brooten Marsh	Allow wildlife observation and photography throughout unit.
Neskowin Marsh Unit	Area remains closed to observation and photography.
<b>Environmental Education</b>	
Environmental education (EE)	Develop a fully functioning, year-round EE program with full-time EE specialist, Nature Discovery Backpack program, and other partner-driven EE programs. Utilize volunteers to deliver on-site EE programs.
<b>Interpretation</b>	
Interpretation	Continue existing programming on Cannery Hill and develop additional interpretive facilities and programs in conjunction with new trails at Cannery Hill and Little Nestucca Restoration Area.
<b>Hunting</b>	
Waterfowl hunting	Allow waterfowl hunting 7 days per week on Brooten Marsh (108 acres) and mouth of Little Nestucca River (33 acres).
<b>Fishing</b>	
Fishing	Allow bank fishing on the east end of the Little Nestucca Restoration Area following development of access trail and gravel parking lot.
Clamming	Adjacent to Brooten Marsh, allow clamming per ODFW regulations and subject to Oregon Department of Agriculture (ODA) and ODFW shellfish safety closures.
<b>Facilities</b>	
Facilities	Keep some existing structures and facilities. Replace residence with a bunkhouse and small administrative office. Add 10 additional parking spaces. Remodel the north bay of the maintenance shop to accommodate two offices. Utilize habitat-appropriate native plants for landscaping around buildings, kiosks, and other public use facilities.
<b>Climate Change Adaptation</b>	
Reduce carbon footprint	Replace current vehicles with more fuel-efficient vehicles. Any new or replaced facilities will be appropriately sized and energy-efficient. Use energy-efficient land management techniques where feasible and in line with management goals. Explore ways of offsetting carbon balance, such as carbon sequestration.

## 2.4 Goals, Objectives, and Strategies

Goals and objectives are the unifying elements of successful refuge management. They focus and describe management priorities and actions that resolve issues and help bring a refuge closer to its vision. A vision broadly reflects the refuge purposes, the Refuge System mission and goals, other statutory requirements, and larger-scale plans as appropriate. Public use and wildlife/habitat management goals then define general targets in support of the vision, followed by objectives that

direct effort into incremental and measurable steps toward achieving those goals. Finally, strategies identify specific tools and actions to accomplish objectives.

The goals for Nestucca Bay NWR over the next 15 years under the CCP are presented on the following pages. The goal order does not imply any priority. Each goal is followed by the objectives that pertain to that goal. Some objectives pertain to multiple goals and have simply been placed in the most appropriate location. Similarly, some strategies pertain to multiple objectives. The timeframe for accomplishing CCP objectives is the 15-year life of the CCP, unless otherwise specified in the objective.

**Readers, please note the following:**

Below each objective statement are the strategies that could be employed in order to accomplish the objectives. Symbols used in the following tables include:

- % percent sign
- > greater than
- < less than

**2.4.1 Goal 1: Protect and maintain agricultural lands supporting wintering migratory birds.**

<b>Objective 1.1 Protect and maintain lowland pastures</b>
<p>Protect and maintain 346 acres of lowland pastures on Nestucca Bay NWR for the benefit of wintering Canada geese (e.g., dusky, Aleutian Canada geese), other waterfowl (e.g., American wigeon, northern pintail, mallard), and other migratory birds (e.g., bald eagle, peregrine falcon, American kestrel) throughout the life of the CCP. Lowland pastures are characterized by the following:</p> <ul style="list-style-type: none"> <li>• Pasture mix (e.g., orchard grass, annual rye, white clover) that is a maximum of 2" to 4" in height by end of October</li> <li>• Saturated to shallowly flooded from October to May</li> <li>• &lt;10% cover of invasive/undesirable plants (e.g., reed canarygrass, Himalayan blackberry, <i>Juncus</i> spp.)</li> <li>• Minimal human disturbance while geese are present (October to April)</li> </ul>
<b>Strategies Applied to Achieve Objective</b>
<b>Management Strategies:</b>
a. Maintain drainage ditches, dikes, and water control structures using heavy equipment to provide adequate drainage and flood protection
b. Mow, green chop (silage), and graze livestock to provide desirable vegetation height
c. Use commercial fertilizers and manure to enhance vegetation productivity and apply with buffers to protect water quality
d. Rehabilitate pastures as needed using standard agricultural practices (e.g., seeding with appropriate pasture mix, fertilizing, liming) to maintain optimum productivity and plant species mix
e. Utilize appropriate IPM techniques including mechanical/physical, chemical, biological, and cultural means (see IPM Appendix)

f. Control nuisance mammals (e.g., nutria, beaver), where necessary, to protect dikes and ditches using appropriate lethal and non-lethal methods
g. Maintain fencing to support cattle grazing and containment
<b>Monitoring Strategies (see also Objective 9.1 Survey):</b>
h. Monitor water quality on the Refuge to ensure contaminant levels are not exceeded and aquatic resources are protected
i. Conduct periodic soil testing to maintain optimal pH levels and soil condition
j. Monitor lowland pasture vegetation height and species composition to achieve desired parameters
k. Monitor populations six subspecies of Canada geese (western, dusky, lesser, Taverner's, Aleutian, cackling) to determine distribution and abundance
l. Monitor waterfowl populations to determine distribution and abundance
m. Monitor nuisance mammals (e.g., nutria, beaver) populations to determine distribution and abundance
n. Monitor invasive plant species (e.g., reed canarygrass, Himalayan blackberry, <i>Juncus</i> spp.) to determine infestation percent and location
<p><b>Rationale:</b> The U.S. Fish and Wildlife Service established the Nestucca Bay National Wildlife Refuge in 1991, in part, to protect and enhance habitat on agricultural lands for wintering geese and other migratory birds. The Refuge currently consists of 1,010 acres, of which 346 acres are actively managed as pasture habitat for geese and other waterfowl. These pasturelands experience sustained waterfowl use from fall through spring and provide quality forage, which improves waterfowl health and survival. Approximately 6,000 to 10,700 Canada geese of six subspecies winter within refuge boundaries, including the delisted Aleutian Canada goose and up to 18% of the world's population of the dusky Canada goose (a Federal species of special concern). Recently, an increase in the number of wintering geese in the Nestucca Bay area has caused serious depredation concerns among dairy farmers.</p> <p>Our goal is to minimize depredation on private pasturelands by maximizing waterfowl use on refuge lands. Refuge pasture management is based on recognition of the importance of short grass habitats to geese and a commitment to habitat protection for the mutual benefit of wildlife and the dairy industry. Current management practices will continue to be followed under the CCP's management direction. A desirable grass mixture of orchard grass, annual rye, and white clover is maintained at a maximum of 2" to 4" in height by end of October through mowing, green chopping (silage), and grazing livestock. Refuge pastures are tested annually to determine soil condition and fertilizer needs to ensure proper growth and health of desired plant species. In addition, invasive plant species are controlled using appropriate IPM techniques including mechanical/physical, chemical, biological, and cultural means so as not to compete with desired plant species. Nuisance mammals (e.g., nutria, beaver) are controlled to protect dikes and ditches using appropriate lethal and non-lethal methods.</p>

**2.4.2 Goal 2: Restore, protect, and maintain upland prairie and grasslands characteristic of the North Pacific Coastal Ecosystem.**

<b>Objective 2.1 Restore upland coastal prairie</b>
<p>Within the next 15 years, restore and then protect and maintain up to 25 acres of upland coastal prairie on Nestucca Bay NWR through a phased restoration project for the benefit of the federally listed Oregon silverspot butterfly, native plants, and other coastal prairie-dependent species. Upland coastal prairie is characterized by the following attributes:</p> <ul style="list-style-type: none"> <li>• &gt;50% relative cover of native prairie species such as California oatgrass, red fescue, pearly everlasting, yarrow, and California aster maintained at a density of no fewer than five flowering stems/square meter</li> <li>• Early blue violet in patches, with densities of &gt;20 plants/patch and at least 100 patches/acre</li> <li>• Little to no thatch buildup</li> <li>• &lt;50% cover of introduced plant species (e.g., orchard grass, annual rye, white clover)</li> <li>• &lt;5% cover of other invasive plants or noxious weeds (i.e., bull thistle, tansy ragwort)</li> <li>• No encroaching woody species</li> <li>• No reed canarygrass</li> <li>• 1-3% bare ground component</li> </ul>
<b>Strategies Applied to Achieve Objective</b>
<b>Management Strategies:</b>
a. Mechanical removal of encroaching woody species to promote desired plant species growth
b. Utilize appropriate IPM techniques including mechanical/physical, chemical, biological, and cultural means (see IPM Appendix)
c. Seeding and planting of native prairie grasses and forbs with local genotypes to achieve desired plant species for the Oregon silverspot butterfly
d. Prescribed fire or other periodic disturbance to prevent thatch buildup and maintain prairie habitat
<b>Monitoring Strategies (see also Objective 9.1 Survey):</b>
e. Monitor native coastal prairie plant species (e.g., early blue violet, California oatgrass, red fescue, pearly everlasting, yarrow, and California aster) to obtain desired composition, percent cover, and density
f. Monitor early blue violet patch and plant density to achieve >20 plants/patch and at least 100 patches/acre
g. Monitor amount of thatch buildup
h. Monitor invasive plant species (e.g., bull thistle, tansy ragwort, reed canarygrass) to determine percent, cover, and location
i. Monitor woody vegetation species to determine percent present
j. Monitor newly planted native grasses and forbs to determine success rate and growth
k. Monitor Oregon silverspot butterfly experimental population (after introduction) to determine distribution and abundance
l. Monitor fire effects on vegetation
m. Monitor bare ground to achieve 1-3%
<b>Rationale:</b> The Cannery Hill Unit of the Nestucca Bay National Wildlife Refuge contains 25 acres of former upland coastal prairie habitat that currently consists of primarily non-native pasture grasses. The site also includes some native grasses and other remnant coastal prairie species,

including red fescue and early blue violet.

Our goal is to restore up to 100 percent of this habitat through a phased restoration project by completing portions gradually over the next 15 years. This area of highly degraded former upland coastal prairie has the potential to provide life-supporting habitat for the federally listed Oregon silverspot butterfly and other coastal prairie-dependent species. The Nature Conservancy's Cascade Head Preserve is located 8 miles south of the Refuge and supports one of only four populations of the threatened Oregon silverspot butterfly. Three of these populations are currently experiencing marked declines. The life history of the Oregon silverspot revolves around its obligatory host plant, the early blue violet. Female butterflies oviposit their eggs among the meadow vegetation near the violet host plant, and after the eggs hatch, the butterfly larvae feed on the violet's leaves.

It is the intention of the Service to have the restored area support an experimental release of the butterflies, which are not currently using the area because of its degraded status. See also Goal 7: Promote the recovery of the federally threatened Oregon silverspot butterfly. The Service will partner with the Institute for Applied Ecology (IAE) to convert a refuge grassland from non-native pasture grasses and other invasive plants to native coastal grasses and forbs with an emphasis on the species and structure required by the Oregon silverspot butterfly. The IAE will partner with the USFWS throughout the restoration process to control invasive species, produce genetically appropriate native plants, and seed and transplant the native plants. In addition, IAE will provide on-site training in invasive species identification and removal as well as appropriate, scientifically sound monitoring techniques.

Native prairie grasses and forbs, including the early blue violet, will be planted and existing native prairie vegetation will be cultivated to stimulate growth. Habitat manipulation such as removal of woody species and thatch buildup will enhance growth and production of native prairie plant species and entice Oregon silverspot butterflies to the area. Also, 1-3% bare ground is needed for the butterfly to warm-up and for access to mud (puddling) for mineral uptake. Edible (or dune) thistle was identified on-site; this native species looks much like the non-native bull thistle. Care will be taken to preserve this native species since bees and butterflies are attracted to it. The cleared area will be planted with species necessary for all life stages of the butterfly, and the planted species will be representative of native coastal headland prairie. Invasive plant species will be controlled using appropriate IPM techniques including mechanical/physical, chemical, biological, and cultural means so as not to compete with desired native prairie plant species.

### **Objective 2.2 Protect and maintain mixed upland grasslands until restored to native upland coastal prairie**

Protect and maintain 14 acres of mixed, upland grasslands on Nestucca Bay NWR for the benefit of migratory birds (e.g., song sparrow, white-crowned sparrow, western meadowlark) and other wildlife (e.g., black-tailed deer) until restored to native upland coastal prairie. See Objective 2.1 for the desired habitat parameters. Restoration of the area will occur as funds and personnel become available. The mixed upland grasslands are characterized by the following attributes:

- Dominated by introduced pasture grasses (e.g., orchard grass, annual rye, white clover)
- <5% cover of reed canarygrass and other invasive plants (e.g., thistle spp., tansy ragwort)
- <5% cover of rank, residual plant cover
- No woody encroachment

<b>Strategies Applied to Achieve Objective</b>
<b>Management Strategies:</b>
a. Utilize appropriate IPM techniques including mechanical/physical, chemical, biological, and cultural means (see IPM Appendix)
b. Greenchopping (silage) – two cuttings with first cutting in July to reduce vegetation height with first cutting in July to protect ground-nesting birds
c. Prescribed fire or other periodic disturbance to rejuvenate stand and reduce residual cover
d. Mechanical removal of encroaching woody species
<b>Monitoring Strategies (see also Objective 9.1 Survey):</b>
e. Monitor woody vegetation species to determine percent present
f. Monitor invasive plant species (e.g., thistle, tansy ragwort, reed canarygrass) to determine percent, cover, and location
g. Monitor native coastal prairie plant species (e.g., early blue violet, California oatgrass, red fescue, pearly everlasting, yarrow, and California aster) to obtain desired composition, percent cover, and density
h. Monitor fire effects on vegetation
i. Monitor migratory birds (e.g., song sparrow, white-crowned sparrow, western meadowlark, killdeer) and other wildlife (e.g., black-tailed deer) populations to determine distribution and abundance
<p><b>Rationale:</b> Under the CCP’s management direction, 14 acres of mixed upland grasslands will be protected and maintained until restored to upland prairie habitat. Currently these grasslands provide nesting habitat, forage, and shelter for migratory birds (e.g., song sparrow, white-crowned sparrow, savannah sparrow) and other wildlife (e.g., black-tailed deer).</p> <p>The ultimate goal is to restore the grasslands within 15 years to upland coastal prairie to provide life-supporting habitat for the federally listed Oregon silverspot butterfly and other coastal prairie-dependent species. We will assess success of restoration efforts on adjacent lands as a basis for the extent of prairie restoration in this area. See Objective 2.1 Restore Upland Coastal Prairie for the restoration plan and desired wildlife and habitat parameters. Restoration of the area will occur as funds and personnel become available.</p> <p>Reed canarygrass has encroached upon the land and will be controlled as a precursor to full-scale prairie restoration. In addition, other invasive plant species will be controlled using appropriate IPM techniques including mechanical/physical, chemical, biological, and cultural means so as not to compete with desired upland grassland or coastal prairie plant species.</p>

### **2.4.3 Goal 3: Protect and maintain upland forests characteristic of the North Pacific Coastal Ecosystem.**

<b>Objective 3.1 Protect and maintain Sitka spruce-western hemlock forest</b>
Protect and maintain 214 acres of Sitka spruce-western hemlock forest on Nestucca Bay NWR for the benefit of migratory landbirds (e.g., chestnut-backed chickadee, pileated woodpecker) and a diverse assemblage of other forest-dependent species (e.g., black-tailed deer, bald eagle, bobcat, Pacific giant salamander) throughout the life of the CCP. The desired attributes of this forested habitat are the following:

<ul style="list-style-type: none"> <li>• 30-95% (73% average) canopy cover of Sitka spruce and western hemlock with DBH 24-36"</li> <li>• 25-95% (83% average) cover of a mosaic of native shrubs (e.g., salmonberry, huckleberry, salal, wax myrtle), ferns, and herbaceous species (e.g., sedges) in understory. Shrub height averages 3 meters (9.8 feet)</li> <li>• 600 square feet/acre density of nurse logs</li> <li>• 6/acre density of snags</li> <li>• &lt;5% cover of invasive plants (e.g., Himalayan blackberry, Scotch broom)</li> <li>• &lt;1% cover English ivy</li> </ul>
<p><b>Strategies Applied to Achieve Objective</b></p>
<p><b>Management Strategies:</b></p>
<p>a. Use appropriate forest management techniques (e.g., girdling, falling) to thin trees using multiple entry approach, where needed</p>
<p>b. Utilize appropriate IPM techniques including mechanical/physical, chemical, biological, and cultural means (see IPM Appendix)</p>
<p><b>Monitoring Strategies (see also Objective 9.1 Survey):</b></p>
<p>c. Monitor migratory landbirds (e.g., chestnut-backed chickadee, pileated woodpecker) and other forest-dependent species (e.g., black-tailed deer, bald eagle, bobcat, Pacific giant salamander) populations to determine distribution and abundance</p>
<p>d. Estimate canopy cover and DBH of Sitka spruce and western hemlock to determine percent cover by species</p>
<p>e. Estimate understory cover of a mosaic of native shrubs (e.g., salmonberry, huckleberry, salal, wax myrtle), ferns, and herbaceous species (e.g., sedges) to determine percent cover by species</p>
<p>f. Monitor snags to determine density and location</p>
<p>g. Monitor invasive plant species (e.g., Himalayan blackberry, Scotch broom, English ivy) to determine percent cover, and location</p>
<p>h. Monitor tree density and thinning efforts to determine areas that need attention</p>
<p>i. Monitor bald eagles to determine distribution, population, and reproductive success</p>
<p><b>Rationale:</b> The long-term target is production of late-successional Sitka spruce and western hemlock forest characteristics and restoration of up to 100% of the historic extent of this forest type within the Refuge. Numerous definitions of late-successional or old growth forest exist and vary by location and dominant tree species. However, most definitions indicate four important structural components: number and minimum size of large live trees; canopy conditions; number and minimum size of snags; and number and size of downed LWD. Late-successional Sitka spruce-western hemlock forests provide nesting habitat, forage, and shelter to a variety of wildlife species. Migratory landbirds use the conifer forests because of the presence of other birds and rodents, bark and wood-boring insects, and conifer seeds. Amphibian species prefer steep cold mountain streams in old growth forests as breeding habitat and require damp litter on the forest floor to survive as metamorphosed adults. Much of this habitat type has been removed from the Oregon coast due to extensive logging and development.</p> <p>The Refuge currently contains 214 acres of Sitka spruce-western hemlock forest. Currently, the forested stands exist within the southern part of the Semidi Tract, Cannery Hill area, and Neskowin Marsh Unit. This on-refuge habitat benefits migratory landbirds (e.g., chestnut-backed chickadee, pileated woodpecker) and a diverse assemblage of other forest-dependent species (e.g., black-</p>

tailed deer, bald eagle, bobcat, Pacific giant salamander).

While this objective emphasizes allowing natural processes (e.g., windfall and natural regeneration in openings) to drive vegetative changes, additional techniques such as thinning, girdling, and falling will also be used to promote the development of late-successional characteristics. Thinning (girdling, falling) trees reduces competition for the resources needed for growth thus promoting larger DBH of late-successional Sitka spruce and western hemlock. Snags are also an important component of a late-successional forest and tree girdling (strip of bark removed from circumference of trunk) can be used to kill trees and create snags.

Maintenance measures, primarily invasive plant control, will be regularly implemented using appropriate IPM techniques including mechanical/physical, chemical, biological, and cultural means. Invasive plants compete with desired tree and shrub species, limit native vegetation production, and cause impacts to food, nesting, and cover for wildlife. Controlling and treating invasive species on a consistent basis will allow the Refuge to continue to provide quality habitat to improve fish and wildlife health and survival.

#### 2.4.4 Goal 4: Enhance, protect, and maintain estuarine habitats characteristic of the North Pacific Coastal Ecosystem.

##### Objective 4.1 Enhance, protect, and maintain salt marsh

Enhance, protect, and maintain 208 acres of salt marsh on Nestucca Bay NWR for the benefit of migratory birds (e.g., American wigeon, northern pintail, mallard, savannah sparrow, great blue heron, northern harrier), salmonids (e.g., Chinook, cutthroat, coho), and diverse assemblage of other species (e.g., river otter, black-tailed deer) throughout the life of the CCP. Salt marsh is characterized by the following attributes:

- Diverse elevations ranging from about 3 feet below mean lower low water (MLLW) to 9 feet above MLLW for tidal flats and tidal marshes. Hydrological flows are affected by high flows in the rivers and tidal cycles
- Low elevation areas are a mosaic of native species including salt grass and pickleweed
- Upper elevation includes Lyngby’s sedge, slough sedge, tufted hairgrass, Pacific silverweed and occasional Henderson’s checkermallow
- Interspersed tidal channels of different orders with LWD component
- Lands completely submerged during high seasonal tidal cycles
- No cordgrass species

##### Strategies Applied to Achieve Objective

###### Management Strategies:

- a. Utilize appropriate IPM techniques including mechanical/physical, chemical, biological, and cultural means (see IPM Appendix)
- b. Outplanting of rare, native species (e.g., Henderson’s checkermallow) to increase native vegetation presence
- c. Clean and disinfect clothing and boating equipment before and after entering salt marsh
- d. Apply public outreach to inform public about invasive or exotic animal species introductions, transport, and control methods

<b>Monitoring Strategies (see also Objective 9.1 Survey):</b>
e. Monitor migratory birds (e.g., savannah sparrow, great blue heron, northern harrier), and other mammal species (e.g., river otter, black-tailed deer) populations to determine distribution and abundance
f. Monitor waterfowl to determine populations and habitat use
g. Monitor salt marsh to determine stopover (feeding and loafing) and breeding habitat parameters for waterfowl
h. Monitor hydrological flows and tidal elevations/cycles to understand hydrological influence and parameters
i. Survey native plant species (salt grass, pickleweed, Lyngby’s sedge, slough sedge, tufted hairgrass, Pacific silverweed and Henderson’s checkermallow) to determine distribution and density
j. Monitor LWD to determine location and composition and vegetation response
k. Monitor salmonid species and other estuary-dependent fish to determine distribution, biological characteristics, and use of LWD installations
l. Monitor water quality to describe water quality parameters
m. Monitor composition and relative abundance of macro invertebrates to determine abundance and distribution
n. Monitor invasive plant (e.g., cordgrass, reed canarygrass, Himalayan blackberry) and animal species to determine distribution and abundance
o. Monitor sedimentation rates and vegetation response within the bay or salt marsh
p. Monitor public use programs (i.e., waterfowl hunting, fishing) to determine fish and wildlife impact and response
q. Work with partners to monitor environmental factors that are climate change related stressors (e.g., changes to hydrology, acidification, storm intensity, floods)
<p><b>Rationale:</b> The 208 acres of salt marsh at Nestucca Bay NWR are functionally connected with mudflat habitat and riverine habitats and act as a transition zone between aquatic and terrestrial sites. These marshes provide shoreline stability against wave and wind erosion, reduce flood peaks, trap nutrients, sediment, and pollutants. Salt marshes are also good for sequestering carbon and, unlike freshwater wetlands, do not produce methane. Tidal wetlands are considered essential habitat for many marine and anadromous fish (including threatened coho salmon) and migratory birds. Salt marshes also provide food and nursery areas for numerous young fish, crabs, shrimp, clams, and other invertebrates. Migratory waterfowl, such as mallard, American wigeon, northern pintail, bufflehead and green-winged teal, use this habitat at Nestucca Bay. Migratory waterfowl and shorebirds in turn provide an important prey base for the recently delisted bald eagle and the peregrine falcon. Slough sedge, tufted hairgrass, Pacific silverweed, and Henderson’s checkermallow are native salt marsh species and are often associated with unaltered estuarine habitat in Oregon.</p> <p>The Refuge’s salt marsh provides critical ecosystem services, especially considering the status of this habitat type in the state. In Oregon’s seventeen largest estuaries, tidal wetland acreage has declined considerably based on pre-settlement estimates. Fourteen of these estuaries have experienced tidal wetland decreases of 40 percent or more (Good 2000). Based on Scranton (2004) and Hawes et al. (2008), Brophy (2011) estimated 16,173 acres of tidal marsh within the state in the 1850s and by 2005 80% of those acres were no longer tidal marsh. As much as 90 percent of</p>

these losses have been for agricultural development and consist of diking and draining of salt marshes to convert them to pastures and crop-growing fields. Within the Nestucca Bay estuary, the comparison of 1850s historic vegetation with recent vegetation mapping indicates a 91% loss of tidal marsh (ibid.).

If unaltered or restored to a more natural hydrologic state (i.e., characterized by sinuous, deeply-incised, and complex tidal channel networks; and the absence of alterations such as ditching, diking, tidegates, restrictive culverts, and roads), salt marsh habitat such as that located at Brooten Marsh and the Little Nestucca Restoration Area will maintain itself with very little or no input from land managers. Outplanting of rare, native species, such as Henderson’s checkermallow, is needed to reestablish a healthy population since this species is nearly absent at Nestucca Bay.

Invasive species degrade habitats that support a diverse community of estuarine organisms including aquatic migratory birds and anadromous fish, and the invertebrate and plant communities that support them. For example, the widespread colonization by cordgrass, which is not currently present on the Refuge, would induce major modifications of physical, hydrological, chemical, and biological estuarine functions. Cordgrass displaces eelgrass on mudflats and native vegetation in salt marshes. This invasive plant must be controlled using IPM techniques including mechanical/physical, chemical, biological, and cultural means.

Introduced native and non-native animal species in salt marshes (New Zealand mudsnail, nutria) are usually in direct competition with native wildlife species for food, shelter, and breeding areas and often cause existing native species populations to decline or become extirpated. Ultimately, invasive animal species can result in considerable impact to native wildlife and the habitat they are dependent upon. Limiting invasive and exotic animal species will provide improved quality habitat and wildlife health and survival. Actions will be taken to reduce competition between native and non-native animal species.

Monitoring sedimentation rates and vegetation response within the bay and salt marsh is important to the understanding of the potential resilience of these habitats to sea level rise, storm surges, and flood events.

**Objective 4.2 Protect and maintain intertidal mudflats**

Protect and maintain 19 acres of intertidal mudflats on Nestucca Bay NWR for the benefit of migratory birds (e.g., American wigeon, mallard, great blue heron, peregrine falcon, western sandpiper, short-billed dowitcher), salmonids (e.g., Chinook, cutthroat, coho), shellfish (e.g., sand shrimp, benthic worms, native clams), and diverse assemblage of intertidal mudflat species (e.g., river otter) throughout the life of the CCP. Intertidal mudflats are characterized by the following attributes:

- Diverse elevations ranging from about 3 feet below MLLW to about 4 feet MLLW that is completely inundated during two daily tidal cycles
- Sandy/muddy substrate that is sparsely vegetated by widgeon grass and seasonal algae blooms
- Presence of LWD
- Presence of biofilm on muddy substrate
- No Japanese eelgrass

<ul style="list-style-type: none"> <li>• No cordgrass species</li> </ul>
<b>Strategies Applied to Achieve Objective</b>
<b>Management Strategies:</b>
a. Utilize appropriate IPM techniques including mechanical/physical, chemical, biological, and cultural means (see IPM Appendix)
b. Work with Oregon Department of State Lands to cooperatively manage resources, treat/monitor invasive species
<b>Monitoring Strategies (see also Objective 9.1 Survey):</b>
c. Monitor migratory birds (e.g., American wigeon, mallard, great blue heron, peregrine falcon, western sandpiper, short-billed dowitcher), salmonids (e.g., Chinook, cutthroat, coho), shellfish (e.g., sand shrimp, benthic worms, native clams), and mammal species (e.g., river otter) to determine populations, biological characteristics, and use of intertidal mudflats
d. Monitor invasive plant species (e.g., Japanese eelgrass, cordgrass) to determine percent cover and location
e. Monitor shorebirds to determine distribution, populations, and habitat use
f. Monitor habitat parameters to determine stopover feeding and loafing habitat quality for shorebirds
g. Monitor composition and relative abundance of macro invertebrates to determine abundance and distribution
h. Monitor/survey biofilm/algae to determine abundance and composition
i. Monitor sedimentation rates and vegetation response within the bay or intertidal mudflats
j. Monitor water quality on the Refuge to ensure contaminant levels are not exceeded and aquatic resources are protected
k. Monitor LWD to determine rate of deposition
l. Work with partners to monitor environmental factors that are climate change related stressors (e.g., changes to hydrology and salinity)
<p><b>Rationale:</b> The 19 acres of intertidal mudflats are functionally connected with salt marsh and riverine habitats which contain a rich invertebrate community that supports a diversity of native fishes, shorebirds, and waterfowl. Algae and diatoms are the principal plant types; vascular plants are rare or absent. Invertebrates such as snails, shrimp, clams, worms, and crabs are locally common or abundant. The most common and important non-fish species occupying the mudflats include Dungeness crab, softshell clams, and sand shrimp. Waders such as great blue heron and great egret, and shorebirds such as least and western sandpiper, dunlin, dowitchers, greater yellowlegs, black-bellied plover, and whimbrel, make extensive use of the mudflats for foraging on macro-invertebrates and in some cases biofilm. Dabbling ducks, diving ducks, gulls, peregrine falcons, and bald eagles also forage there. Harbor seals forage on the mudflats when they are inundated at high tide and in the lower bay or they haul out on the flats and spit to rest. LWD provides perch sites for migratory birds including raptors and waders.</p> <p>Intertidal mudflats tend to maintain their integrity naturally and managers need to conduct very little active management. As a result, to accomplish this objective, the Refuge primarily needs to pursue invasive species control. Invasive species such as Japanese eelgrass and cordgrass degrades habitats that support a diverse community of estuarine organisms including aquatic migratory birds and anadromous fish, and the invertebrate and plant communities that support them. Widespread colonization by these invasive plants induces major modifications of physical, hydrological,</p>

chemical, and biological estuarine functions. Japanese eelgrass and cordgrass displaces native eelgrass on mudflats and other native vegetation in salt marshes. Actions would be taken to reduce competition between native and non-native vegetation species. These invasive plants must be controlled using IPM techniques including mechanical/physical, chemical, biological, and cultural means. Since land owned by the state is adjacent to refuge lands, we would work cooperatively with the State of Oregon to control invasives. At minimum, eradication efforts would be attempted on an annual basis on properties within Nestucca Bay to remove and prevent further spread of invasive species. Water quality must also be closely monitored since lowland pastures are nearby and the spread of manure or commercial fertilizer and herbicide is a common practice. If fertilizers or other chemicals enter the water system, they can be deposited within the environment and bio-accumulate in associated organisms.

Sedimentation is a natural event which occurs in bays and estuaries and can alter plant communities and hydrology. The rate of sedimentation should be monitored and the habitat changes due to sedimentation documented. Monitoring sedimentation rates and vegetation response for intertidal mudflats is important to the understanding of the potential resilience of this habitat type to sea level rise, storm surges, and flood events.

### 2.4.5 Goal 5: Protect and maintain freshwater habitats characteristic of the North Pacific Coastal Ecosystem.

#### **Objective 5.1 Protect and maintain mesic Sitka spruce-skunk cabbage-slough sedge association (forested lagg) in the Neskowin Marsh Unit**

Protect and maintain 61 acres of mesic Sitka spruce-skunk cabbage-slough sedge association within the Neskowin Marsh Unit at Nestucca Bay NWR for the benefit of migratory landbirds (e.g., chestnut-backed chickadee, pileated woodpecker) and a diverse assemblage of other forest-dependent species (e.g., black-tailed deer, bobcat, northwestern salamander) throughout the life of the CCP. The attributes of this forested lagg are the following:

- 60-100% canopy cover dominated by Sitka spruce and western hemlock, where 75% is Sitka spruce
- DBH of overstory trees is 50-118"
- >25% cover of a mosaic of native shrubs (e.g., salal), ferns, and herbaceous species (e.g., slough sedge, skunk cabbage) in understory
- 6/acre density of snags
- <5% cover of invasive plants (e.g., Himalayan blackberry)
- No English ivy

#### **Strategies Applied to Achieve Objective**

##### **Management Strategies:**

a. Utilize appropriate IPM techniques including mechanical/physical, chemical, biological, and cultural means (see IPM Appendix G)

##### **Monitoring Strategies (see also Objective 9.1 Survey):**

b. Monitor migratory landbirds (e.g., chestnut-backed chickadee, pileated woodpecker) and other forest-dependent species (e.g., black-tailed deer, bobcat, northwestern salamander) to determine populations and use of forested lagg

c. Monitor/survey Sitka spruce and western hemlock to determine canopy cover and DBH

d. Monitor/survey native shrubs (e.g., salal), ferns, and herbaceous species (e.g., slough sedge, skunk cabbage) to determine understory percent cover

e. Survey snags to determine density

f. Monitor/survey invasive plant species (e.g., Himalayan blackberry, English ivy) to determine percent cover and location

**Rationale:** The mesic Sitka spruce-skunk cabbage-slough sedge association is found within forested laggs (or wetlands) that form a swamp-like moat around the outer edges of some bogs. At the Neskowin Marsh Unit, this unique, exceedingly rare habitat type is >200 years old and in a late-successional stage. This forested wetland is part of a habitat complex with exceptional biological value important to a diverse and abundant group of plant and animal species. Migratory landbirds (e.g., chestnut-backed chickadee, pileated woodpecker) and a diverse assemblage of other forest-dependent species are abundant and use the surrounding upland habitat for hunting, foraging, and resting. In addition, snags offer nesting cavities for many migratory landbird species.

This habitat type tends to maintain itself naturally, and managers typically need to conduct very little active management. As a result, to accomplish this objective, the Refuge primarily needs to pursue control of invasive plants. Invasive plant species such as Himalayan blackberry and English ivy present challenges. Himalayan blackberry readily invades riparian areas, forest edges, oak woodlands, meadows, roadsides, clear-cuts, and any other relatively open area, including all open forest types. Once it becomes well established, it out competes low stature native vegetation and can prevent establishment of shade intolerant trees, leading to the formation of apparently permanent blackberry thickets with little other vegetation present. English ivy is a vigorous growing vine that impacts all levels of disturbed and undisturbed forested areas, growing both as a ground cover and a climbing vine. As the ivy climbs in search of increased light, it engulfs and kills branches by blocking light from reaching the host tree’s leaves. English ivy is present on the Refuge in this habitat, and control efforts need to be continued.

**Objective 5.2 Protect and maintain coastal bog in the Neskowin Marsh Unit**

Protect and maintain 70 acres of coastal bog habitats (i.e., shrub-carr, sphagnum, sedge fen) on the Neskowin Marsh Unit of Nestucca Bay NWR for the benefit of migratory landbird (e.g., common yellowthroat) and a diverse assemblage of other wildlife species (e.g., black-tailed deer, bobcat, northwestern salamander) and rare plants species and assemblages throughout the life of the CCP. The attributes of this coastal bog habitat are the following:

- Permanently flooded with 1-48" depths with mosaic of scattered open water areas
- Water quality is tannic (pH ranges from 4.8 to 6.2)
- Deep peat soils
- Presence of native shrubs (e.g., smooth Labrador tea) typically occurring in high acidic sites
- Presence of rare plants including russet cotton grass, native cranberry, and *Pohlia sphagnicola* (moss)
- Presence of insectivorous round leaf sundew plant
- No swamp loosestrife, water lily, or English ivy
- <5% cover of other invasive plants (e.g., Himalayan blackberry)

**Strategies Applied to Achieve Objective**

**Management Strategies:**

a. Utilize appropriate IPM techniques including mechanical/physical, chemical, biological, and

cultural means (see IPM Appendix)
<b>Monitoring Strategies (see also Objective 9.1 Survey):</b>
b. Monitor water quality to detect presence of off-site contaminants (point and non-point sources)
c. Monitor presence of invasive species (e.g., Himalayan blackberry, swamp loosestrife, water lily, and English ivy) including plot-based sampling to determine location and infestation percent
d. Monitor migratory landbird (e.g., common yellowthroat) and other wildlife species (e.g., black-tailed deer, bobcat, northwestern salamander) to determine populations and use
e. Monitor native shrubs (e.g., smooth Labrador tea), rare plants (russet cotton grass, native cranberry, and <i>Pohlia sphagnicola</i> ), and insectivorous round leaf sundew plant to determine distribution and abundance
<p><b>Rationale:</b> The coastal bog of Neskowin Marsh is a rare habitat type. Rare plants such as russet cotton grass, native cranberry, and <i>Pohlia sphagnicola</i> (moss) are present. Migratory landbirds (e.g., common yellowthroat) and a diverse assemblage of other wildlife species are abundant and use the surrounding upland habitat for hunting, foraging, and resting. There are three types of coastal bog within Neskowin Marsh, including sedge fen, shrub-carr, and sphagnum bog. The sedge fen is distinguished from other bog habitats because of the neutral pH of the water; this type of coastal bog is dominated by slough sedge and Sitka sedge. The shrub-carr bog is dominated by western crabapple, Trapper’s tea, and Hooker willow. The rare and diverse sphagnum bog has been developing over a period of at least several thousand years. The sphagnum bog within Neskowin Marsh is the southernmost sphagnum bog on the West Coast. It contains the largest known occurrence of acid-forming mire on the Oregon coast and supports the rare pohlia moss, which occurs on the tops of sphagnum hummocks.</p> <p>This habitat type tends to maintain itself naturally, and managers need to actively complete very little work unless invasive plant species are present. Invasive plant species (Himalayan blackberry, swamp loosestrife, water lily, and English ivy) displace native vegetation, altering the composition and structure of vegetation communities, affecting food webs, and modifying ecosystem processes. Very little invasive plant species control efforts have been conducted at Neskowin Marsh, and these species continue to invade and spread through the marsh. As a result, to accomplish this objective, the Refuge primarily needs to pursue control of invasive plants.</p>

**Objective 5.3 Protect and maintain freshwater, emergent wetland in the Neskowin Marsh Unit**

Protect and maintain 33 acres of freshwater, emergent wetland on the Neskowin Marsh Unit at Nestucca Bay NWR throughout the life of the CCP for the benefit of waterfowl (e.g., wood ducks, northern pintail, mallard), rails (e.g., Virginia rail, American coot), other migratory landbirds (e.g., red-winged blackbird, common yellowthroat), native amphibians (e.g., northwestern salamander, red-legged frog), salmonids (e.g., coho salmon, coastal cutthroat), and a diverse assemblage of other species (e.g., river otter, beaver). The attributes of this freshwater, emergent wetland are the following:

- Permanently flooded with water depths ranging from saturated soils to 36" deep
- Scattered stands of native trees including Hooker willow
- Mosaic of native emergents (e.g., giant burreed, hard-stem bulrushes) with pockets of open water with submergent plants (e.g., pondweeds, coontail)
- No swamp loosestrife or water lily
- <5% cover of reed canarygrass

<b>Strategies Applied to Achieve Objective</b>
<b>Management Strategies:</b>
a. Utilize appropriate IPM techniques including mechanical/physical, chemical, biological, and cultural means (see IPM Appendix)
b. Maintain current tsunami evacuation trail and footbridge to allow residents safe passage in the event of a tsunami
c. Modify footbridge to enhance safety, accessibility, and hydrologic connectivity based on results of hydrologic study
<b>Monitoring Strategies (see also Objective 9.1 Survey):</b>
d. Conduct hydrologic study to determine effects of tsunami evacuation trail (old roadbed) has on water flow and assess management opportunities
e. Monitor water quality to detect presence of off-site contaminants (point and non-point sources)
f. Monitor invasive species (e.g., swamp loosestrife, water lily, reed canarygrass) to determine presence and infestation percent
g. Monitor waterfowl (e.g., wood ducks, northern pintail, mallard), rails (e.g., Virginia rail, American coot) other migratory landbirds (e.g., red-winged blackbird, common yellowthroat), native amphibians (e.g., northwestern salamander, red-legged frog), and mammals (e.g., river otter, beaver) to determine population and distribution
h. Monitor salmonids (e.g., coho salmon, coastal cutthroat) and other fish to determine abundance and use
<p><b>Rationale:</b> The freshwater emergent wetland at the Neskowin Marsh Unit consists of freshwater pools and ponds interspersed with emergent vegetation such as bulrush, giant bur-reed, Douglas spirea, and water parsley. The largest bulrush stand along the Oregon coast occurs at this location. Waterfowl (e.g., wood ducks, northern pintail, mallard), rails (e.g., Virginia rail, American coot), other migratory landbirds (e.g., red-winged blackbird, common yellowthroat), native amphibians (e.g., northwestern salamander, red-legged frog), and a diverse assemblage of other species (e.g., river otter, beaver) are abundant and use the surrounding habitat for hunting, foraging, and resting. Refuge biologists have documented substantial use of Neskowin Marsh by juvenile coho salmon and cutthroat trout. Juvenile coho salmon may use the marsh as off-channel overwintering habitat. In the spring, thousands of egg masses laid by amphibians appear in the marsh, indicating its importance as a breeding area for red-legged frogs and northwestern salamanders. The recently delisted peregrine falcon and bald eagle nest in the general vicinity.</p> <p>This habitat type tends to maintain itself naturally, and managers typically need to conduct very little active management. As a result, to accomplish this objective, the Refuge primarily needs to pursue control of invasive plants. Invasive species such as swamp loosestrife, water lily, and reed canarygrass have been noted on the Refuge; however, very little control efforts have been conducted, and these species continue to invade and spread throughout the wetland.</p> <p>A small footbridge spans the Meadow Creek outlet channel of the marsh and serves as one of only a few tsunami escape routes for Neskowin, a low-lying community. The tsunami evacuation trail traverses the south end of the marsh near the north end of the Neskowin Beach Golf Course. The trail was in existence before establishment of the Neskowin Marsh Unit of the Refuge and acquisition of this parcel in 2002. This trail allows local residents in the nearby dunes to escape on foot to high ground in the Neskowin Crest area as well as passage to U.S. Highway 101 during a locally generated tsunami event. The Service acknowledges that the trail floods annually following</p>

heavy rainfall, as does the adjacent Hawk Road that leads to the trail. The Service will install reflective markers on both sides of the trail to outline the trail route during flooding or at night. Individuals using the trail do so at their own risk, which will require wading if the trail is flooded. Residents should be aware that during a subduction zone earthquake the trail may receive damage prior to the arrival of a tsunami.

This trail is located on a former roadbed that extended across the marsh linking Hawk Street with Cove Crest Drive. It is unknown at this time how the presence of the old roadbed may be affecting the hydrology of the marsh by impounding water and impacting the health of the marsh. Therefore, a detailed hydrologic study is needed.

## 2.4.6 Goal 6: Protect and maintain forested wetlands and stream-riparian habitats characteristic of the North Pacific Coastal Ecosystem.

### Objective 6.1 Protect and maintain wet-mesic Sitka spruce-western hemlock forest

Protect and maintain 6 acres of wet-mesic Sitka spruce-western hemlock forest and adjacent riparian habitat on Nestucca Bay NWR throughout the life of the CCP for the benefit of migratory landbirds (e.g., chestnut-backed chickadee, Wilson’s warbler, pileated woodpecker) and a diverse assemblage of other forest-dependent species (e.g., black-tailed deer, bobcat, northwestern salamander). The desired attributes of wet-mesic Sitka spruce-western hemlock forest are the following (based on Brophy 2009, Brophy et al. 2011, Brophy and van de Wetering 2012, NatureServe 2012):

- Periodic freshwater tidal and/or seasonal riparian flooding
- Flat topography with local microrelief caused by logs, stumps, and buttressed roots of spruce trees
- High organic content of soils (>20% organic matter)
- Woody vegetation dominated by native trees and shrubs (e.g., Sitka spruce, red alder, Hooker willow, Sitka willow, twinberry, Pacific crabapple). Dominant herbaceous species include slough sedge and skunk cabbage with non-wetland species (e.g., salal, huckleberry) growing on fallen logs or spruce root platforms.
- <5% cover of invasive plants (e.g., blackberry, gorse, Scotch broom)
- No English ivy

#### Strategies Applied to Achieve Objective

##### Management Strategies:

a. Utilize appropriate IPM techniques including mechanical/physical, chemical, biological, and cultural means (see IPM Appendix)

##### Monitoring Strategies (see also Objective 9.1 Survey):

b. Monitor migratory landbird (e.g., chestnut-backed chickadee, Wilson’s warbler pileated woodpecker) and other forest-dependent species (e.g., black-tailed deer, bobcat, northwestern salamander) population and use

c. Monitor plant community composition (i.e., percent cover of trees, shrubs, ferns, and herbaceous species)

d. Determine woody species stem density and basal area

e. Monitor salmonids and other fish to determine use and distribution

f. Monitor invasive plant species (e.g., Himalayan blackberry, Scotch broom, reed canarygrass,

English ivy) to determine abundance and distribution

**Rationale:** For the purposes of this CCP, wet-mesic Sitka spruce-western hemlock forests are defined as woody habitats that consist of valley forested wetlands and riparian forest along rivers, salt marsh, or mudflats (e.g., National Vegetation Classification Standard *Tsuga heterophylla* - *Picea sitchensis*/*Lysichiton americanus* Hardwood-Conifer Rich Swamp Group, NatureServe 2012). Riparian and wetland forests are highly variable in their composition, size, and structure. Periodic freshwater tidal and/or seasonal riparian flooding are the major natural processes that drive this system. Soils are perennially wet, usually with high organic content. Historically, many of the areas located in the lower brackish (mesohaline to oligohaline) and freshwater tidal zones of Oregon’s estuaries were likely Sitka spruce and/or shrub tidal swamp. Tidal swamps were also found on the margins of the marine salinity zone where freshwater dilutes ocean water, such as along tributary streams, on high natural levees, and in hillslope seepage zones.

The 6 acres of wet-mesic Sitka spruce-western hemlock (lowland riparian) forest are found on the Refuge fringing the Brooten Marsh. Migratory landbirds (e.g., chestnut-backed chickadee, Wilson’s warbler, pileated woodpecker) and a diverse assemblage of other forest-dependent species are found here and use the surrounding habitat for hunting, foraging, and resting. This area also provides off-river habitat for salmonids during high waters, including the threatened coho salmon.

Invasive plant species such as Himalayan blackberry, English ivy, and Scotch broom present the same challenges for this habitat type as described in Objective 5.1. Due to lack of funding and staff, control efforts to date have been sporadic and not sufficient to halt spread of these species on the Refuge.

### 2.4.7 Goal 7: Promote the recovery of the federally threatened Oregon silverspot butterfly.

#### **Objective 7.1 Establish Oregon silverspot butterfly – nonessential, experimental population**

Initiate introduction of a healthy, sustainable population of the Oregon silverspot butterfly within the life of the CCP on upland prairie habitat on Nestucca Bay NWR. The long-term objective, which will follow a timeline that will extend beyond the life of the CCP, is a sustainable population that is characterized by the following attributes:

- Minimum viable population of 200 to 500 butterflies for at least 10 years
- Located in permanently protected habitat within an identified habitat conservation area
- Located in habitat that is managed to maintain at approximately 3 percent early blue violet cover, multiple nectar sources flowering throughout the butterfly’s flight period, and minimal presence of invasive and competitive plants

#### **Strategies Applied to Achieve Objective**

##### **Management Strategies:**

- a. See strategies listed under restoration of upland prairie habitat (Objective 2.1)
- b. Partner with various entities as appropriate (Oregon Zoo, ODFW, Xerces Society, TNC, USFWS Ecological Services) to establish larval host plant/adult nectar plant populations and introduce butterfly populations
- c. Develop butterfly release plan to outline certain number of butterflies released, timeframe, and monitoring strategies

d. Release pupae and/or larvae of a nonessential experimental population according to the plan when an appropriate amount of high quality habitat has been established
<b>Monitoring Strategies (see also Objective 9.1 Survey):</b>
e. Survey native Oregon silverspot butterfly to determine presence or absence
f. Monitor nonessential experimental Oregon silverspot butterfly (larvae and/or adult) to determine population and introduction success
g. Monitor early blue violet to determine cover and percent composition
h. Monitor invasive plant species to determine abundance and distribution
i. Monitor upland prairie habitat native plant species to determine composition and abundance
<p><b>Rationale:</b> The Oregon silverspot butterfly, a unique and rare species, is listed as a federally threatened species. The life history of the Oregon silverspot revolves around its obligatory host plant, the early blue violet. Female butterflies oviposit their eggs among the meadow vegetation near the violet host plant, and after the eggs hatch, the butterfly larvae feed on the violet leaves. The Nature Conservancy’s Cascade Head Preserve is located 8 miles south of the Refuge and supports one of only five populations of the Oregon silverspot butterfly, four in Oregon and one in California near the border with Oregon. Three of these populations are currently experiencing marked declines.</p> <p>The Service will introduce and sustain a nonessential, experimental population of the Oregon silverspot butterfly within restored high quality upland coastal prairie habitat on Nestucca Bay NWR. Under the Endangered Species Act, Secretary of Interior may designate restored populations established outside the species’ current range, but within its historical range, as “experimental.” Based on the best scientific and commercial data available, experimental populations are deemed either “essential” or “nonessential” to the continued existence of the species. Regulatory restrictions are considerably reduced under a nonessential, experimental population designation.</p> <p>An Oregon silverspot butterfly captive-rearing program began in 1999 to raise caterpillars for release into declining populations. These population augmentations or reintroductions are a last resort to prevent further population extinctions and support implementation of the recovery plan. Multiple years of releases are needed to successfully stabilize the declining populations, but the augmentation appears to be a promising species recovery tool.</p> <p>Prior to any experimental introduction of the butterfly, the Service will restore 25 acres of rare and unique upland coastal prairie habitat at Cannery Hill to the standard delineated in the species’ recovery plan (see Objective 2.1 Restore Upland Coastal Prairie for the restoration plan and desired wildlife and habitat parameters). Cannery Hill contains a remnant of upland coastal prairie that provides life-supporting habitat for the federally listed butterfly and other coastal prairie-dependent species. Our goal is to restore up to 100 percent of this habitat through a phased restoration project gradually over the next 15 years. The Service will partner with the Institute for Applied Ecology (IAE) to convert a refuge grassland from non-native pasture grasses and other invasive plants to native coastal grasses and forbs with an emphasis on the species and structure required by the Oregon silverspot butterfly. Native prairie grasses and forbs, including the early blue violet, will be planted and existing native prairie vegetation will be cultivated to stimulate growth. Habitat manipulation such as removal of woody species and thatch buildup will enhance growth and production of native prairie plant species. Also, a 1-3% bare ground standard is needed</p>

for the butterfly to warm-up and for access to mud (puddling) for mineral uptake.

The establishment or introduction of the experimental population will occur toward the end of the CCP (15 years), due to the time needed for the native prairie restoration. The minimum viable population of 200 to 500 butterflies for at least 10 years is a long-term objective that will not occur within the life of this CCP (15 years). The restoration of upland prairie habitat and release of the experimental population will entice native Oregon silverspot butterflies to the area.

**2.4.8 Goal 8: Enhance, protect, and maintain instream aquatic habitat for all dependent species including anadromous and estuary-dependent fish.**

**Objective 8.1 Enhance, protect, and maintain instream aquatic habitat**

Enhance, protect, and maintain instream aquatic habitat within the Refuge throughout the life of the CCP for anadromous fish and other estuary-dependent fish common in the Nestucca estuary and refuge tributaries, including fall Chinook salmon, chum salmon, coho salmon, winter steelhead, and cutthroat trout. Instream aquatic habitat is characterized by the following attributes:

- Instream and estuary channel presence of woody and organic debris
- Meandering estuary channels and freshwater creeks (e.g., complex and braided) with unimpeded fish access
- Water quality that will meet life-history needs for salmonids (e.g., water temperature 12.8°-17.8°C, dissolved oxygen levels >7.0 mg/L)
- Instream substrate (spawning gravel), <5% cover, pool/riffle ratio suitable for cutthroat trout
- <1% non-native or invasive fish (e.g., largemouth bass, bluegill) and plants

**Strategies Applied to Achieve Objective**

**Management Strategies:**

a. Installation and maintenance of LWD (i.e., logs and root wads) in stream channels to promote diverse hydrological and physical structure

b. Provide spawning (cutthroat trout) and rearing habitat (salmon)

c. Plant and maintain streamside vegetative cover to reduce water temperatures

d. Work cooperatively with ODFW and adjacent landowners to address fish passage and water quality issues

e. Coordinate with ODFW, USFS, and other partners to support physical habitat restoration actions listed in the Oregon Coast Coho Conservation Plan for the Nestucca watershed ([http://www.dfw.state.or.us/fish/CRP/docs/coastal\\_coho/final/Coho\\_Plan.pdf](http://www.dfw.state.or.us/fish/CRP/docs/coastal_coho/final/Coho_Plan.pdf))

f. Work cooperatively with ODFW and USFWS Fisheries Program to understand, monitor, and control non-native invasive fish (e.g., largemouth bass, bluegill) that are competitive with native fishes

g. Work cooperatively with researchers to inventory, monitor, determine species composition and richness of estuary and instream invertebrate community

**Monitoring Strategies (see also Objective 9.1 Survey):**

h. Monitor salmonids to determine distribution, biological characteristics, and use of LWD installations

i. Monitor water quality (e.g., temperature, turbidity, dissolve oxygen, pH, toxins, nutrients, organic loading, dissolved and suspended solids) to detect presence of off-site contaminants (point

and non-point sources)

j. Monitor estuary and instream benthic invertebrates to determine species composition, diversity, and abundance

k. Monitor riparian and estuary invasive plant and animal species to determine infestation, abundance, and distribution

**Rationale:** Protection and enhancement of aquatic habitat is important to anadromous and estuary-dependent fish species. The Nestucca River watershed is a productive fishery resource for the State of Oregon. Salmonids common in the Nestucca system include spring and fall Chinook salmon, coho salmon (threatened species), summer and winter steelhead, and coastal cutthroat trout.

Threats currently facing salmonids and other estuary-dependent fish include the present or threatened destruction, modification, or curtailment of habitat or range. In many Oregon coastal streams, past human activities (e.g., logging, agriculture, gravel mining, urbanization) have resulted in impediments to fish passage, degradation of stream complexity, increased sedimentation, reduced water quality and quantity, loss and degradation of riparian habitats, and loss and degradation of lowland, estuarine, and wetland salmonid rearing habitats. Most anadromous fish species in the Pacific Northwest have been in decline for decades. Spring Chinook salmon, coho salmon, chum salmon and coastal cutthroat trout all have depressed populations. Coho salmon on the Oregon Coast are listed as “Threatened” on the Federal Threatened and Endangered Species List.

Conserving and restoring salmonid populations is an important goal, not only for their own sake, but also because of their cultural, historical, and ecological value. Salmonids are an important food source for numerous other wildlife species. Sixty-seven wildlife species of the Pacific Northwest, including many known to inhabit the Refuge, have been known to have a “strong” or “recurrent” relationship with salmon (Cederholm et al. 2000). For a full list of benefitting species, see Appendix E, Biological Resources of Concern.

For successful production, juvenile salmonids that live at the edges of streams or in backwater areas depend on the presence of streambank vegetation and abundant instream structure created by logs and root wads, as well as adequate water quality. LWD has been placed at the Little Nestucca Restoration Area to provide cover and to increase channel diversity quality, which improves health and survival of estuary-dependent and juvenile salmonids.

To control invasive non-native fish such as largemouth bass and bluegill, the Refuge will work cooperatively with ODFW and other fisheries biologists to detect the presence of and remove and control these species to reduce competition between native and non-native fish species. Invasive plant species have been noted on the Refuge; however, very limited control efforts have been conducted and these species may be continuing to invade and spread through refuge aquatic habitat. Limiting invasive species will provide quality forage to improve fish health and survival. Invasive species will be controlled using appropriate IPM techniques including mechanical/physical, chemical, biological, and cultural means to prevent them from competing with desired native species. Tidal saltwater inundation of the 82-acre tidal marsh restoration project along the Little Nestucca River is resulting in the natural elimination of invasive red canarygrass and Himalayan blackberry.

**2.4.9 Goal 9: Research and monitoring. Gather scientific information (surveys, research, and assessments) to support adaptive management decisions.**

<b>Objective 9.1 Conduct inventory and monitoring surveys</b>
Throughout the life of the CCP, conduct high-priority inventory and monitoring (survey) activities that evaluate resource management and public-use activities to facilitate adaptive management. These surveys contribute to the enhancement, protection, use, preservation, and management of wildlife populations and their habitats on- and off-refuge lands. Specifically, they can be used to evaluate achievement of resource management objectives identified under Goals 1 through 8 in CCP. These surveys have the following attributes: <ul style="list-style-type: none"> <li>• Data collection techniques will likely have minimal animal mortality or disturbance and minimal habitat destruction</li> <li>• Minimum number of samples (e.g., water, soils, vegetative litter, plants, macroinvertebrates, vertebrates) to meet statistical analysis requirements will be collected for identification and/or experimentation in order to minimize long-term or cumulative impacts</li> <li>• Proper cleaning of investigator equipment and clothing as well as quarantine methods, where necessary, will minimize the potential spread or introduction of invasive species</li> <li>• Projects will adhere to scientifically defensible protocols for data collection, where available and applicable</li> </ul>
<b>Strategies Applied to Achieve Objective</b>
a. Prepare inventory and monitoring plan
b. Early detection and rapid response monitoring to identify new or spreading invasive plant and animal problems
c. Collect data and samples of fish, wildlife, and habitat parameters to determine overall health of the Refuge
d. Utilize scientific survey protocols for data collection to ensure quality results
e. Utilize most recent and up-to-date survey equipment to ensure reliable data are collected
f. Implement management strategies as needed as identified by survey data to maintain biological integrity, diversity, and environmental health
g. Monitor invasive/nuisance plant and animal species in mudflats, salt marsh, freshwater wetlands, uplands, and forested habitats to determine distribution and infestation
h. Monitor forest diseases and pests to determine presence and extent
i. Monitor salmonids to determine distribution, biological characteristics, and use of LWD
j. Monitor mammals, migratory landbirds, shorebirds, waterfowl (including white-cheeked geese), insects, and amphibians to determine populations, distributions, and habitat use
k. Conduct long-term hydrological, biological, and physical monitoring to determine effectiveness of salt marsh and coastal prairie restoration projects
l. Monitor water quality returning to river and bay to determine pollution levels
m. Conduct periodic soil testing to maintain optimal pH levels and soil condition
n. Monitor habitat parameters including vegetation associated with respective habitat types to determine health of ecosystem
o. Monitor sedimentation rates and vegetation response within the bay or salt marsh

p. Monitor public use programs (i.e., waterfowl hunting) to determine waterfowl impact and response
q. Monitor Sitka spruce and western hemlock to determine growth rate, density, canopy cover and DBH
r. Monitor a mosaic of native shrubs (e.g., salmonberry, huckleberry, salal), ferns, and herbaceous species (e.g., sedges) to determine understory cover
s. Monitor snags to determine density
t. Monitor existing and planted trees and shrubs to determine survival rate
u. Monitor tree density and thinning efforts to determine areas that need attention
v. Monitor/survey biofilm/algae to determine abundance and composition
w. Monitor hydrological parameters (e.g., flow regime—timing and magnitude) and associated physical attributes (e.g., water temperature, dissolved oxygen levels) to determine if parameters are within water quality standards
x. Monitor hydrological flows and tidal elevations/cycles to understand hydrological influence and parameters
y. Monitor wetland native vegetation to determine species composition
z. Monitor vegetation and wildlife to determine response to IPM techniques
aa. Hire an additional permanent full-time (PFT) Wildlife Biologist to identify survey needs, collect scientific data, and meet the needs of the Refuge’s biological program
<p><b>Rationale:</b> National Wildlife Refuge System Administration Act of 1966, as amended (16 U.S.C. 668dd-ee) set a requirement to “... monitor the status and trends of fish, wildlife, and plants in each refuge.” Surveys will be used primarily to evaluate resource response to assess progress toward achieving refuge management objectives (under Goals 1 through 8 in this CCP) derived from the NWRs Mission, refuge purpose(s), and maintenance of biological integrity, diversity, and environmental health (601 FW 3).</p> <p>Determining resource status and evaluating progress toward achieving objectives is essential to implementing adaptive management on Department of Interior lands as required by policy (522 DM 1). Specifically, results of surveys will be used to refine management strategies, where necessary, over time in order to achieve resource objectives. Surveys will provide the best available scientific information to promote transparent decision-making processes for resource management over time on refuge lands.</p> <p>The Service will provide staff to adequately address biological complexity of the Refuge with the goal of hiring an additional Permanent Full Time (PFT) Wildlife Biologist. Currently, the Complex has only one PFT Wildlife Biologist for six national wildlife refuges. The Wildlife Biologist will design and implement scientific studies.</p>

**Objective 9.2 Conduct research**

Throughout the life of the CCP, conduct high-priority research projects that provide the best science for habitat and wildlife management on and off the refuge. Scientific findings gained through these projects will expand knowledge regarding life-history needs of species and species groups as well as identify or refine habitat and wildlife management actions. Wildlife and habitat responses to refuge management actions will be monitored through research projects, and as a result, resource management objectives and adaptive management will be facilitated to achieve

desired outcomes. These research projects have the following attributes:

- Adhere to scientifically defensible protocols for data collection, where available and applicable, in order to develop the best science for resource management
- Data collection techniques will have minimal animal mortality or disturbance and minimal habitat destruction
- Collect the minimum number of samples (e.g., water, soils, vegetative litter, plants, macroinvertebrates, vertebrates) to meet statistical analysis requirements for identification and/or experimentation in order to minimize long-term or cumulative impacts
- Utilize proper cleaning of investigator equipment and clothing as well as quarantine methods, where necessary, to minimize the potential spread or introduction of invasive species
- Often result in peer reviewed articles in scientific journals and publications and/or symposiums

**Strategies Applied to Achieve Objective**

a. Identify and articulate priority management-oriented research needs to a wide scientific audience

b. Collect data and samples of fish, wildlife, and habitat parameters to meet statistical analysis requirements

c. Utilize scientific survey protocols for data collection to ensure quality results

d. Utilize most recent and up-to-date survey equipment to ensure reliable data are collected

e. Quarantine or clean investigator equipment and clothing to prevent spread of invasive plant and animals

f. Conduct research on salt marshes to determine accretion and subsidence rates

g. Conduct research on the potential effects of climate change and sea level rise on salt marshes

**Rationale:** Like monitoring, results of research projects will expand the best available scientific information and potentially reduce uncertainties to promote transparent decision-making processes for resource management over time on refuge lands. In combination with results of surveys, research will promote adaptive management on refuge lands. Scientific publications resulting from research on refuge lands will help increase the visibility of the NWRS as leader in the development of the best science for resource conservation and management.

Research projects on refuge lands will address a wide range of natural and cultural resource as well as public-use management issues. Examples of management-oriented research projects include habitat use and life-history requirements for specific species/species groups, practical methods for habitat management and restoration, extent and severity of environmental contaminants, techniques to control or eradicate pest species, effects of climate change on environmental conditions and associated habitat/wildlife response, identification and analyses of paleontological specimens, modeling of wildlife populations, and assessing response of habitat/wildlife to disturbance from public uses. Projects may be species-specific, refuge-specific, or may evaluate the relative contribution of refuges to larger landscape (e.g., ecoregion, region, flyway, national, international) issues and trends.

The findings from two ongoing projects may elicit new fields of inquiry and research, and influence priorities for inventory and monitoring on the Refuge. The Refuge will monitor the results of coastal and marine species climate sensitivity analyses (in progress, Dr. Deborah Reusser, USGS, lead researcher, funded by the North Pacific Landscape Conservation Cooperative) and a North Pacific birds sensitivity analysis (in progress, PRBO-Conservation

Science, funded by the North Pacific Landscape Conservation Cooperative).

**Objective 9.3 Conduct scientific assessments**

Throughout the life of the CCP, conduct scientific assessments to provide baseline information that will expand our knowledge regarding the status of refuge resources and better inform resource management decisions. The scientific assessments will contribute to the development of refuge resource objectives and they will also be used to facilitate habitat restoration through selection of appropriate habitat management strategies based upon site-specific conditions.

- Utilize accepted standards, where available, for completion of assessments
- Scale and accuracy of assessments will be appropriate for development and implementation of refuge habitat and wildlife management actions

**Strategies Applied to Achieve Objective**

- a. Utilize scientific assessment results to implement management strategies to benefit ecosystems
- b. Complete water resource assessment for the Refuge – Division of Engineering, Water Resources Branch
- c. Develop a National Vegetation Classification Standard vegetation data layer for use in GIS
- d. Conduct hydrological assessment at Neskowin Marsh
- e. Conduct baseline assessment of water chemistry and monitor changes over time to determine acidification rate

**Rationale:** In accordance with the Service policy for implementing adaptive management on refuge lands (522 DM 1), appropriate and applicable environmental assessments are necessary to determine resource status, promote learning, and evaluate progress toward achieving objectives whenever using adaptive management. These assessments will provide fundamental information about biotic (e.g., vegetation data layer) as well as abiotic processes and conditions (e.g., soils, topography, hydrology) that are necessary to ensure that implementation of on-the-ground resource management actions achieve resource management objectives identified under Goals 1 through 8. For example, a baseline estuary water chemistry analysis is lacking and needed to monitor the long-term potential effects of ocean acidification, a high risk to refuge resources.

**2.4.10 Goal 10: Provide and manage quality opportunities for visitors of all abilities to observe and/or photograph six subspecies of Canada geese and other wildlife using lowland pastures along with coastal wetlands, grasslands, and mixed hardwood forest thus promoting the protection and preservation of coastal ecosystems.**

**Objective 10.1 Provide high-quality wildlife observation and wildlife/nature photography opportunities at Cannery Hill**

Throughout the life of the CCP, provide visitors of all ages and different abilities with a variety of safe and accessible opportunities at Cannery Hill to successfully observe or photograph wildlife and the surrounding landscape while limiting the impacts of wildlife and habitat disturbance. Quality wildlife observation and wildlife/nature photography programs at Cannery Hill are defined by several elements including:

- Focusing on major wildlife species and groups of wildlife species, including wintering waterfowl, raptors, and neotropical songbirds
- Incorporating a diversity of habitats

<ul style="list-style-type: none"> <li>• Using various types of facilities (e.g., trails, observation decks) in order to view/photograph wildlife and their habitats</li> <li>• Emphasizing activities on a year-round basis</li> <li>• Satisfying a range of skill sets, from casual and beginning observers/photographers to more advanced observers/photographers</li> </ul>
<p><b>Strategies Applied to Achieve Objective</b></p>
<p>a. Maintain the Pacific View Trail, observation deck, and associated parking lot</p>
<p>b. Build a Discovery Trail and observation deck in the lower parking lot</p>
<p>c. Develop a seasonal trail that follows the current power line right of way</p>
<p>d. Develop a trail to direct visitors from the lower parking lot safely to the Pacific View Trail (i.e., loop trail)</p>
<p>e. Provide signs and brochures that promote appropriate use of trails and observation decks to minimize wildlife and habitat disturbance</p>
<p>f. Develop a bird checklist</p>
<p>g. Partner with the local Chamber of Commerce and other organizations to support nature-based tourism including the Birding and Blues Festival</p>
<p>h. Work with refuge volunteers and other partners to develop, improve and maintain public use trails</p>
<p><b>Rationale:</b> Wildlife and nature photography promotes public understanding and appreciation for the Refuge’s natural resources. At Cannery Hill, public use infrastructure is in place for wildlife observation, photography, interpretation, and environmental education. The Refuge maintains two parking lots for the public at Cannery Hill. The paved lower parking lot has 10 standard parking spaces, two school bus spaces, and a single vault restroom. The paved upper parking lot contains five standard parking spaces. The lower parking area of Cannery Hill contains a welcoming kiosk that orients visitors to the Refuge. It contains information on the hiking trails, things for visitors to do, and the rules and regulations of the Refuge. This area will benefit from the addition of a few visitor amenities. The Refuge is completing the development of a new observation deck in the lower parking lot to provide visitors with an opportunity to view and photograph wildlife using woodlands, lowland pastures, and grasslands. The Refuge will also build a “discovery trail” that will link the existing orientation kiosk to the new observation deck. The discovery trail will serve two main purposes: to provide a safe and accessible route for pedestrians to move between the existing kiosk and new observation deck without having to walk through the parking lot, and to provide a needed programmatic element that converts the lower parking area into a destination worth visiting.</p> <p>The Refuge will add another trail that will increase the opportunity for visitors to observe and photograph wildlife. There is a grassy, undeveloped trail that follows the power line corridor from Christensen Road to a refuge-owned tide gate and dike (i.e., the Powerline Trail). The trail is maintained by staff, volunteers, and the local power company, but it is currently closed to public use. The trail goes through a variety of habitats and provides visitors with the best opportunity to view small songbirds on the Refuge. The Service will improve this trail and open it for seasonal use. Specifically, wildlife observation and photography will be allowed from April 1 through September 30. Because the trail passes alongside pastures used by wintering white-cheeked geese and the Refuge strives to provide undisturbed feeding areas for geese, the trail will be closed to the public from October 1 through March 31.</p>

From the lower parking lot of Cannery Hill, visitors can either drive or walk to the upper parking lot. Both routes take visitors through a matrix of forest including restored forest, mature coniferous forest, and a small patch of native hardwoods. If visitors walk they must share the roadway with cars, which presents a safety hazard, even though traffic volume is low. Consequently, the Refuge will design and develop a loop trail with the express purpose of getting visitors off the road and onto a safer route. The trail will begin in the lower parking lot, traverse through refuge woodlands, and end at the Pacific View Trail. Except for the Powerline Trail, all of the trails and observation decks will be open year-round for the purpose of wildlife observation, photography, environmental education, and interpretation, and visitors will be restricted to staying on the trail.

From the upper parking lot, visitors can access the Pacific View Trail, which is 0.3 mile in length, paved, and wheelchair-accessible. It leads visitors to an elevated viewing deck perched atop Cannery Hill. There are four interpretive panels that share the story of the diversity of wildlife habitats and wildlife found on the Refuge. This trail is used by visitors for wildlife observation, photography, interpretation, and environmental education.

All environmental education programs on the Refuge are informal and are led by refuge volunteers, interns, or staff. The Service will continue to allow these uses on Cannery Hill and will require advance reservations for all groups participating in environmental education. The Service will also require that, prior to engaging in activities, all groups be educated on refuge etiquette and ways to reduce disturbance to wildlife and habitat.

The Birding and Blues Festival is an annual springtime event hosted by the community of Pacific City. The Service is one of the festival sponsors, offering presentations, workshops, and guided bird walks. The festival events educate birders of all interest levels and ages, promote tourism in the area, and inform visitors of the many outdoor activities available in the area, including the Refuge.

**Objective 10.2 Provide high-quality wildlife observation and wildlife/nature photography opportunities at the Little Nestucca Restoration Area, Brooten Marsh, and Neskowin Marsh Unit**

Throughout the life of the CCP, provide visitors of all ages and different abilities with a variety of safe and accessible opportunities at the Little Nestucca Restoration Area, Brooten Marsh, and the Neskowin Marsh Unit to successfully observe or photograph wildlife and the surrounding landscape while limiting the impacts of wildlife and habitat disturbance. Quality wildlife observation and wildlife/nature photography programs in these designated areas are defined by the same elements as in Objective 10.1.

**Strategies Applied to Achieve Objective**

- a. Develop a short and accessible trail along the old roadbed in the Little Nestucca Restoration Area and allow wildlife observation and photography year-round
- b. Improve the parking lot on the west end of the restoration site
- c. Keep the tsunami evacuation trail at Neskowin Marsh open as an escape route and make the bridge on the tsunami evacuation trail Architectural Barriers Act (ABA) accessible
- d. Keep tsunami evacuation trail open and conduct a hydrologic study and modify roadbed and bridge to improve hydrology and accessibility
- e. Allow unrestricted walking, year-round, for the purpose of wildlife observation and photography

on Brooten Marsh

**Rationale:** The former U.S. Highway 101 roadbed is on the west end of the restoration site on the Little Nestucca River. The restoration site is a great place to view wintering waterfowl. The Refuge will improve the roadbed by grading a small parking area, building a short trail that leads visitors of all abilities into a portion of the restoration site, screening the trail with vegetation to reduce wildlife disturbance, and developing a welcoming and orientation kiosk.

A small wooden footbridge spans Neskowin Marsh’s outlet channel serves as one of only a few tsunami escape routes for the low-lying community of Neskowin. The tsunami evacuation trail traverses the south end of Neskowin Marsh and is located on a former roadbed that crossed the marsh. The trail was in existence before establishment of the Neskowin Marsh Unit of the Refuge and is kept open for the safety of the community. The trail allows local residents in the nearby dunes to escape on foot to high ground in the Neskowin Crest area as well as passage to U.S. Highway 101.

The Refuge will conduct a hydrologic study to determine if the roadbed is negatively affecting marsh hydrology and ecology and is therefore in need of modification. The hydrologic study will be designed to guide the modification of the former roadbed to improve hydrology and accessibility. See also Objective 5.3.

**2.4.11 Goal 11: Offer hands-on environmental education programs to communities that promote life-long learning about coastal wildlife and their habitats.**

**Objective 11.1 Provide high-quality environmental education opportunities for children and adults**

Throughout the life of the CCP, provide quality hands-on environmental education programs to community groups and schools with an emphasis on the themes of habitat restoration, climate change, invasive species management, and the natural history of white-cheeked geese. In addition, a high quality environmental education program at Nestucca Bay NWR should also include the following attributes:

- Emphasize enjoyable, hands-on, outdoor learning
- Appeal to a broad range of learning styles and provide interdisciplinary opportunities that link natural resources through multiple academic subject areas
- Minimize impacts to fish, wildlife, plants, and their habitats; other compatible public uses; and refuge management programs and facilities
- Link directly to wildlife observation and interpretation programs

**Strategies Applied to Achieve Objective**

- a. Hire a full-time permanent Environmental Education Specialist
- b. Seek grant opportunities to develop curriculum and programming
- c. Develop a nature discovery backpack check-out program
- d. Recruit, train and utilize volunteers to deliver on-site environmental education programs
- e. Collaborate with partners to enhance environmental education opportunities and to ensure refuge programming is unique and does not conflict with other programming in the county
- f. Develop and implement evaluation techniques to maintain program quality

g. Partner with schools to engage students in hands-on learning and stewardship
h. Foster long-term support for the environmental education program with the assistance of the refuge friends group once established
i. Engage adults through citizen science programs
j. Evaluate effectiveness of environmental education efforts through pre- and post-program evaluations for students and surveys for teachers
<p><b>Rationale:</b> Environmental education plays a key role in encouraging current and future generations to engage in environmentally responsible behavior like supporting the protection of habitat for wildlife through the National Wildlife Refuge System. Currently the Refuge offers very few and no formal environmental education (EE) programs on-site at Nestucca Bay NWR. All EE programs are informal and led by refuge volunteers, interns, or staff. The number of students and community groups served is limited by the availability of staff and volunteers needed to manage a program. The Service will continue to allow EE programs on Cannery Hill and will require advance reservations for all groups participating in EE. Prior to engaging in activities, students and groups will be educated on refuge etiquette and ways to reduce disturbance to wildlife and habitat.</p> <p>The Refuge engages adults in EE at Nestucca Bay NWR through a citizen science program called Project NestWatch. NestWatch is a continent wide citizen-science project and nest monitoring database of the Cornell Lab of Ornithology. The Refuge will continue with this program indefinitely and will seek opportunities to engage volunteers and visitors in other Citizen Science programs.</p> <p>In 2001, the Oregon Coast National Wildlife Refuge Complex entered into a long-term partnership with the Jane Goodall Environmental Middle School (JGEMS) in an effort to enable students to learn biological research methods in an outdoor classroom alongside dedicated professionals who are passionate about environmental education and the land. In this partnership the Refuge and JGEMS have tackled a variety of research projects that not only benefit the students but have added to the baseline knowledge of biological resources. The Refuge will continue to foster this partnership throughout the life of the CCP and will seek out new partnerships with local schools.</p> <p>Friends groups often play a critical role in supporting a refuge EE program. Friends groups have the ability to raise funds, write curriculum, implement programs, and expand community involvement. Establishment of a refuge friends group at Nestucca Bay is a high priority for the Refuge. Once the friends group is established, group members' involvement in EE will be encouraged.</p>

**2.4.12 Goal 12: In cooperation with partners and volunteers offer year-round interpretive opportunities to visitors of all ages and abilities to learn about and experience a range of coastal habitats including coastal prairie, estuary, and tidal marsh, thus instilling an ethic of conservation and resource protection for coastal wildlife adapted to these habitats.**

<b>Objective 12.1 Provide high-quality interpretive opportunities at Cannery Hill</b>
Throughout the life of the CCP, provide visitors with opportunities for self-guided and refuge-led interpretation at Cannery Hill. A high-quality interpretive program will consist of the following

features: <ul style="list-style-type: none"> <li>• Emphasize learning about white-cheeked goose management, coastal prairie restoration, and invasive species management</li> <li>• Emphasize non-guided activities but offers periodic guided programs</li> <li>• Link directly to the wildlife observation and environmental education programs</li> </ul>
<b>Strategies Applied to Achieve Objective</b>
a. Hire a permanent, full-time north coast refuge manager
b. Establish a refuge friends group
c. Hire a permanent, full-time refuge volunteer coordinator
d. Expand current programming for guided natural history and birding hikes conducted by refuge staff, volunteers, and partners
e. Maintain interpretive facilities at Cannery Hill
f. Develop an interpretive trail guide
<b>Rationale:</b> Interpretation is identified as one of the priority public uses of the National Wildlife Refuge System. Interpretation will be used at Nestucca Bay NWR as a way to provide information to visitors, either through a self-guided experience or one that is led by refuge staff, about Canada goose management, coastal prairie restoration, and invasive species management with the ultimate goal of enhancing their appreciation, understanding and enjoyment of the Refuge’s natural resources. Interpretation will also be used to help in visitor management by sharing refuge rules and regulations in a manner that encourages visitors to care for the Refuge and its wildlife. The Service will also have staff and volunteers expand current programming to offer guided natural history and birding hikes.
A successful interpretive program depends on the help of volunteers and partnerships. They are key components of the successful management of refuge lands and are vital to refuge biological and public use programs and projects. This is especially true in times of static or declining budgets. Currently the Refuge makes extensive use of volunteers in public use programs and to a lesser degree in habitat management and biological inventory and monitoring. In the future, successful implementation of environmental education and interpretation programs will require the use of partnerships, including a refuge friends group, and volunteers. Thus it is important that the Refuge have a refuge manager and volunteer coordinator on staff to manage these critical partnerships.

<b>Objective 12.2 Provide high-quality interpretive opportunities at the Little Nestucca Restoration Area</b>
Throughout the life of the CCP, provide visitors with opportunities for self-guided and refuge-led interpretation at the Little Nestucca Restoration Area. A high-quality interpretive program at these units consists of the same features as in Objective 12.1 except that the focal topics are wintering waterfowl, salmonid use of estuaries, sphagnum bogs, and other rare habitats, and the function of tidal marshes.
<b>Strategies Applied to Achieve Objective</b>
a. Develop interpretive panels for the Little Nestucca Restoration Area public use trail
b. Partner with the Tillamook Estuaries Partnership to develop an interpretive water trail guide
c. Offer a minimum of two interpreter-led paddle trips annually
<b>Rationale:</b> The Service will expand interpretation on the Refuge by offering interpreter-led paddle trips each summer. It will partner with the Tillamook Estuaries Partnership to market the water

trail guide developed for the Nestucca and Little Nestucca Rivers. Water trails are defined paths on a waterway connected through signs, maps, and access points providing a scenic and educational experience for recreational users. These forms of interpretive material will help educate the public on minimizing wildlife and habitat disturbance.

**2.4.13 Goal 13: Provide and manage safe, enjoyable, and quality hunting and fishing opportunities for people of varying ages and resources that further the tradition of wildlife conservation and stewardship.**

**Objective 13.1 Provide opportunities for quality waterfowl hunting**

Throughout the life of the CCP, provide an opportunity for waterfowl hunters of all ages and abilities to hunt a variety of dabbling and diving ducks on 141 acres, while minimizing impacts to wintering dusky Canada geese, other wildlife, and other recreational users. Provide a quality, safe waterfowl hunt program that:

- Place a priority on safety
- Include clear and concise regulations and makes them readily available
- Pose minimal conflict with wildlife and habitat objectives
- Pose minimal conflict with other priority public use activities
- Pose minimal conflict with neighboring lands

**Strategies Applied to Achieve Objective**

- a. Prepare waterfowl hunting plan and opening package
- b. Allow hunting on Brooten Marsh
- c. Allow hunting on at the mouth of the Little Nestucca River
- d. Develop an informational tear sheet on the rules and regulations of waterfowl hunting at Nestucca Bay NWR
- e. Allow hunters to access refuge lands open to hunting via boat or foot
- f. Conduct law enforcement patrols on a regular basis to ensure compliance with state and Federal waterfowl hunting regulations

**Rationale:** Hunting is identified as a priority public use by the NWRS Improvement Act, when it is compatible with national wildlife refuge purposes. There is currently no official hunting program on Nestucca Bay NWR because of the establishment purpose of the Refuge as undisturbed quality wintering habitat for Canada geese. Consequently all lowland pastures will remain closed to waterfowl hunting to maximize goose use and minimize goose depredation on adjacent private lands.

Public duck hunting opportunities in the area surrounding Nestucca Bay NWR are limited, with the next nearest opportunities occurring on Tillamook Bay. Private lands offer waterfowl hunting opportunities but only to those who are granted permission and/or the ones willing and able to purchase hunting rights or leases. There is a demand for public hunting in the Nestucca Valley, especially those lands that have walk-in access and do not require the use of a boat. During the public scoping process the Service received requests to allow hunting on refuge lands at Nestucca Bay. There was specific interest by ODFW to provide walk-in opportunities for hunters on the Refuge. Allowing waterfowl hunting on Brooten Marsh and the mouth of the Little Nestucca River will increase hunting opportunities in the area for hunters with or without a boat.

During the public scoping process it was requested that hunting be allowed on the Little Nestucca Restoration Area. The 82-acre restoration is a narrow band of habitat bordering Highway 130/Little Nestucca River Road. Allowing hunting at this site would result in 100% of the tidal marsh habitats within Nestucca Bay NWR being open to waterfowl hunting with no refuge sanctuary provided within this habitat type. Consequently the Service will keep the area closed to all waterfowl hunting.

With this CCP, and in accordance with ODFW hunting regulations, the Refuge will open refuge lands at Brooten Marsh (108 acres) and the mouth of the Little Nestucca River (33 acres) to waterfowl hunting. Through participation in a waterfowl hunt program, hunters will have an opportunity to learn about and understand the Refuge’s purpose and resource management activities.

For Brooten Marsh, hunters will access the area either via boat or by walking in from a pull-out along Brooten Road near the southeast corner of the marsh (Figure 2-1). The Service will improve a trail that leads from this pull-out to Brooten Marsh to support this and other wildlife-dependent uses planned for the area. Access to the mouth of the Little Nestucca River is only possible via boat. There are three public boat launches nearby that hunters occasionally use to launch their watercraft. For both areas, access to refuge lands will be allowed for hunting from one hour before sunrise to one hour after sunset. Establishment of permanent blinds will not be allowed; however, hunters will be allowed to use portable blinds or blinds constructed of on-site dead vegetation or driftwood under the condition that they either be removed or disassembled at the end of each day.

**Objective 13.2 Provide opportunities for quality fishing**

Throughout the life of the CCP, provide opportunities for visitors to clam and fish from refuge lands in accordance with state fishing regulations, while minimizing impacts to other resources. Provide a quality fishing program that:

- Includes clear and concise regulations that are readily available
- Poses minimal conflict with wildlife and habitat objectives
- Poses minimal conflict with other priority public use activities

**Strategies Applied to Achieve Objective**

- a. Prepare fishing plan and opening package
- b. Allow bank fishing on the east end of the Little Nestucca Restoration Area
- c. Adjacent to Brooten Marsh, allow clamming per ODFW regulations and subject to ODA and ODFW shellfish safety closures
- d. Develop a pedestrian trail on the east side of the restoration site
- e. Develop a gravel parking lot on east end of the restoration site
- f. Conduct law enforcement patrols on a regular basis to ensure compliance with state and Federal fishing regulations

**Rationale:** Fishing is identified as a priority public use, and this popular activity occurs at many locations along the Oregon coast. Recreational fishing is a popular sport off-refuge on the navigable waters of both the Little Nestucca River and the Nestucca River from boats, and also on the riverbanks on private lands. The Refuge will increase opportunities for bank fishing by allowing it to occur on lands restored by the Service along Little Nestucca River. Allowing bank fishing along the southeastern bank of the Little Nestucca Restoration Area will increase opportunities for fishing in this area, provide an opportunity for people who do not own or have

access to a boat, and help create a greater awareness among anglers about the importance of estuaries to salmonids.

To improve access for fishing, the Service will develop a small gravel parking lot on the northeast side of the Unit along Highway 130/Little Nestucca River Road. The Service will develop and improve a short pedestrian trail along the dike on the east end of the restoration area to lead safely to the bank of the Little Nestucca River. The trail will be open for anglers to access during daylight hours only. Camping, overnight use, and fires will be prohibited. Anglers will be permitted to use pole and line or rod and reel while bank fishing and will be required to follow ODFW regulations for fishing in bays and tidelands. Anglers will be allowed to use either bait or artificial lures. The designated sites along the trail will concentrate anglers and potentially generate trash including monofilament line, which can entangle wildlife and is therefore a hazard. The Service will provide containers for anglers to discard their used monofilament line.

Clamming is currently allowed on state-owned tidelands at Nestucca Bay. Clamming takes place on state tidelands adjacent to refuge lands and may spill over onto the Refuge due to lack of boundary posting on the Brooten Marsh Unit. Because fishing (i.e., clamming) is one of the Service’s priority wildlife-dependent public uses, the Refuge supports clamming on and adjacent to Brooten Marsh and the development of improved safe access working cooperatively with the ODFW’s sport fishing program. In addition to the harvest of clams, the harvest of sand shrimp other marine invertebrates for bait is included within the term clamming. If the Service is notified by the ODA and ODFW of a shellfish safety closure or contaminant issue that threatens human health, the Refuge will take corrective action (e.g., closure of fishing/hunting).

To provide for additional clamming opportunities in Nestucca Bay, the Refuge will allow clamming on the 100-acre Brooten Marsh and the adjacent 19 acres of refuge mudflats located where the Nestucca River joins the Little Nestucca River. The entire mudflat habitat within the marsh will be open to clamming. Clammers will access the marsh by walking in from a pull-out along county maintained Brooten Road. The Service will improve a trail that leads from this pull-out to Brooten Marsh to support this and other planned wildlife-dependent uses for the area. Visitors will be allowed to harvest softshell clams by digging with a hand shovel or using a clam gun (i.e., aluminum or PVC-piped suction device).

**2.4.14 Goal 14: Provide facilities and materials that welcome and orient children and adults to Nestucca Bay National Wildlife Refuge so they can easily and safely learn about its fish and wildlife resources.**

**Objective 14.1 Provide facilities that welcome and orient visitors to the Refuge**

Throughout the life of the CCP, provide an integrated set of welcome and orientation facilities for visitors to:

- Feel welcomed
- Easily find accurate, timely, and appropriate orientation materials and information
- Be aware of their options (available activities and experiences, where and when to go, how to get there, etc.)
- Safely pursue self-guided activities

**Strategies Applied to Achieve Objective**

- a. Maintain restroom in lower parking lot of Cannery Hill

b. Replace refuge volunteer residence with a small administrative office/visitor contact station/two room bunkhouse
c. Add five additional parking spaces for staff by the Maintenance Shop
d. Add five additional parking spaces for staff and visitors by the administrative office
e. Remodel the north bay of the maintenance shop to accommodate two offices: one for maintenance staff and another for the refuge friends group
f. Determine if lower parking lot needs to be redesigned to accommodate extra parking spaces on south side
g. Mark Neskowin Marsh tsunami evacuation trail with signs
h. Utilize habitat-appropriate native plants for landscaping around buildings, kiosks, and other public use facilities
<p><b>Rationale:</b> As described in the Oregon State Parks Regional Interpretive Framework (Oregon Parks and Recreation Department [OPRD] 2005), the Oregon Coast is considered one of the world’s most stunning landscapes. It features dramatic rocky shoreline, historic lighthouses, endless beaches, quaint seaside towns, and scenic bridges. The U.S. Highway 101 National Scenic Byway follows the shoreline and is the main route used by visitors who come to the coast from Portland and other inland population centers including Corvallis, Eugene, Roseburg, Medford, and Grants Pass.</p> <p>According to OPRD, bird watching, walking, and day hiking will be the most popular recreation activities over the next 10 years (OPRD 2008). Visitors to the Oregon Coast NWR Complex will likely stop for a couple of reasons: a short 20-minute stop made to look at a view and take a picture, or a longer, one- to three-hour, stop allowing visitors to leave the car and stretch their legs. Interpretive signs may enhance observation, interpretation, and education during short stops. Visitors making longer stops may be more interested in learning about the site, taking in a short program, or taking a short walk, and the Refuge will be adding trails and interpretive signs to meet these needs.</p> <p>Cannery Hill was identified in a Facilities Review plan as the best location on the north coast to provide a range of opportunities that allow visitors to experience refuge natural resources. Opportunities include stunning views, interpretive signage, and a variety of walking trails that provide wildlife viewing opportunities. In addition, this site already has infrastructure such as parking and a vault toilet. To accommodate increasing visitation to the Refuge, the Service will replace the current refuge volunteer residence with a small administrative office/two room bunkhouse combination. To support these facilities the Service will also add 10 additional parking spaces. The Service will remodel the north bay of the maintenance shop to accommodate two offices: one for maintenance staff and a second for the refuge friends group. This will increase Refuge staff capability to maintain visitor facilities and interact directly with visitors.</p>

<p><b>Objective 14.2 Conduct public outreach</b></p> <p>Throughout the life of the CCP, conduct outreach to the public in an effort to:</p> <ul style="list-style-type: none"> <li>• Describe the Refuge and its place as part of the National Wildlife Refuge System</li> <li>• Provide current information about refuge management, biology, volunteer opportunities, public use events, and rules and regulations</li> </ul>
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<b>Strategies Applied to Achieve Objective</b>
a. Maintain an up-to-date brochure on the Refuge Complex
b. Partner with media outlets in Oregon to market public use opportunities on the Refuge
c. Participate in social media outreach
d. Maintain a refuge website
e. Maintain online photo sharing database
f. Partner with non-profit conservation organizations and appropriate media outlets in Oregon to disseminate information about refuge wildlife and habitats
g. Maintain a refuge presence at community events that have high potential to deliver refuge messages to key audiences
h. Evaluate the potential to develop digital trail guides for use on MP3 players and/or smartphones
<b>Rationale:</b> Outreach is critical in educating the public, volunteers, and partners about how refuges protect and conserve natural resources and what we are doing to provide economic benefits to communities. When people know and understand about the mission of the Service and the NWRs they are more likely to support the Refuge. Outreach can also improve visitors' awareness of regulations and policies and the reasons behind them.
Our outreach efforts will focus on providing specific information about Nestucca Bay NWR including important news and events and will be used as a means of building an online community of support for the Oregon coast refuges. Specific examples of outreach will involve maintaining a refuge website and utilizing social media to advertise volunteer opportunities, announce interpretative and environmental education events, relate news releases, distribute the refuge newsletter, share photos and videos, and provide an engaging view of what employees and volunteers do for the Oregon Coast NWR Complex.

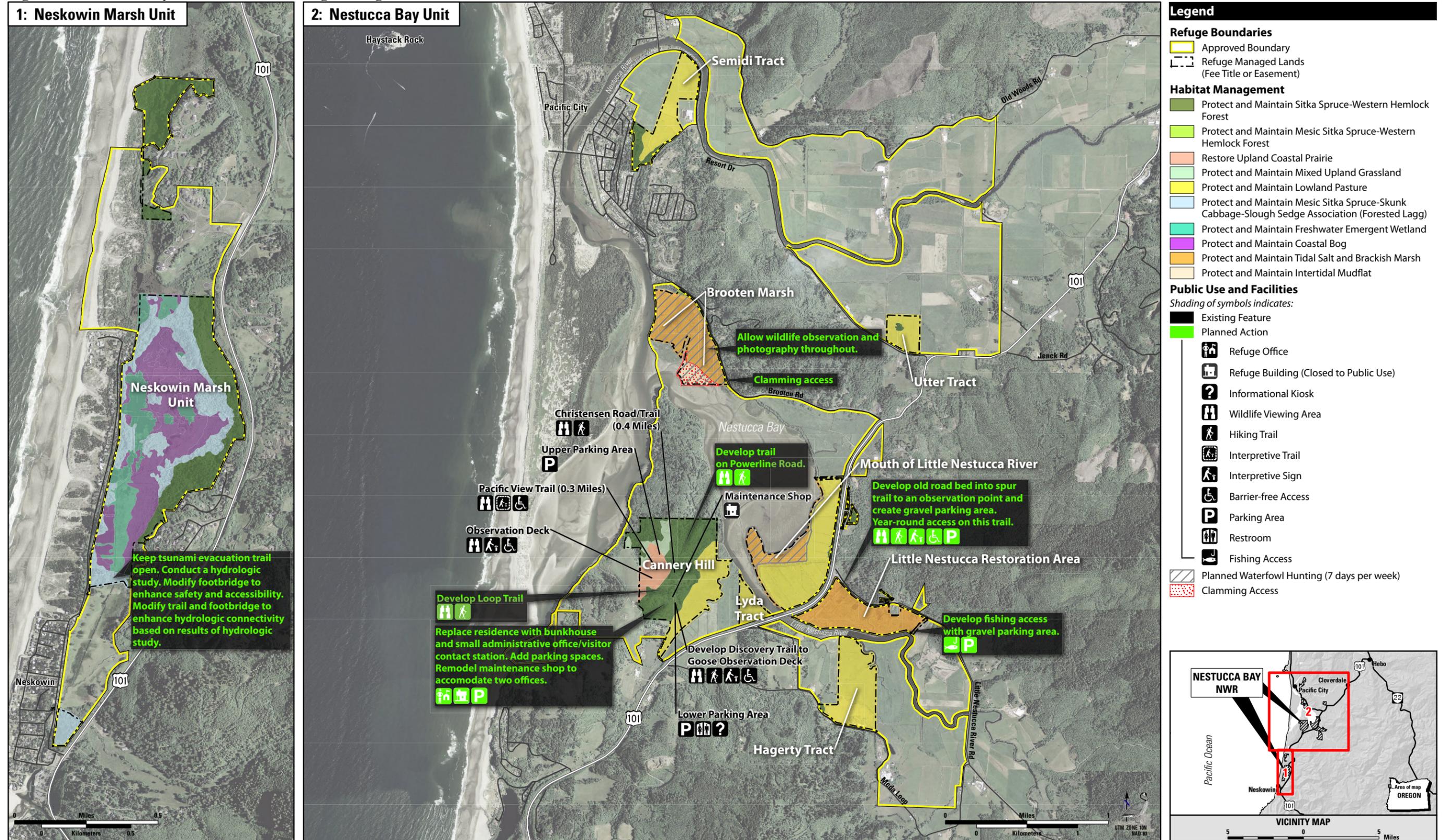
<b>Objective 14.3 Establish partnerships with friends groups and volunteers</b>
Throughout the life of the CCP, develop and support a friends group and increase volunteer program to assist with public use programming, monitoring, research, and maintenance on the Refuge.
<b>Strategies Applied to Achieve Objective</b>
a. Establish a friends group and solicit individuals or groups to become involved
b. In conjunction with friends group, develop habitat-related projects that support refuge monitoring, research, and maintenance needs
c. Dedicate a refuge staff member to serve as the liaison between the friends group and the Refuge, including attendance at friends group board meetings
d. Work with friends group and volunteers to assist with maintenance of public use facilities and trails
e. Work with friends group to recruit volunteers to conduct monitoring projects on the Refuge
f. Hire a full-time volunteer coordinator GS-9
<b>Rationale:</b> In the past 15 years a network of groups, called friends, have adopted individual refuges or complexes and have begun to advocate for the needs of refuges by providing both financial and volunteer support. Friends groups and volunteers are recognized as key components of the successful management of public lands and are vital to implementation of refuge wildlife and habitat programs. During these times of declining budgets the National Wildlife Refuge System faces a growing shortage of staff, and in many cases funding for key conservation

programs has been reduced.

Through establishment of a friends group at Nestucca Bay NWR, the Refuge will benefit by increasing the support it gives and receives from the community. The friends group will in turn play a critical role in providing volunteer support for the Refuge and serve as an advocate for protecting refuge wildlife and habitat.

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Figure 2-1. Nestucca Bay National Wildlife Refuge management direction.



Data Sources: Refuge Boundaries from USFWS/R1; Roads from ESRI; Imagery from 2009 NAIP

**The back sides of maps are blank to improve readability.**