

# Chapter 2 Management Alternatives



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## Chapter 2. Management Alternatives

### 2.1 Alternatives Development

During development of the alternatives for this long-term conservation plan, the Service reviewed and considered a variety of resource, social, economic, and organizational aspects important for managing both Grays Harbor National Wildlife Refuge and the Black River Unit of Billy Frank Jr. Nisqually National Wildlife Refuge. As is appropriate for national wildlife refuges, resource considerations were fundamental in designing alternatives. House Report 105-106 accompanying the National Wildlife Refuge System Improvement Act of 1997 states "...the fundamental mission of our System is wildlife conservation: wildlife and wildlife conservation must come first."

The CCP planning team reviewed scientific reports and studies to understand ecosystem trends and the latest scientific recommendations for species and habitats found at the Refuge and the Unit. The Service reached out to staff from Federal, State, and local agencies, Tribes, and elected officials to ascertain priorities and issues. Service staff met or communicated with Refuge and Unit users, representatives of nonprofit groups, and community organizations to ensure that their comments and ideas were considered during CCP development. Further details of public involvement and participation are found in Appendix J.

### 2.2 Alternatives Considered but Eliminated from Detailed Study

During development of the alternatives, the planning team considered the actions described below for Grays Harbor Refuge and the Black River Unit. These actions were ultimately eliminated from further consideration for the reasons provided.

#### 2.2.1 Grays Harbor National Wildlife Refuge

**Waterfowl Hunting:** During the public scoping period, the Service received comments requesting opportunities to hunt waterfowl on the Refuge (see Appendix J). Waterfowl hunting is a wildlife-dependent, priority public use, which receives special consideration in planning (see Chapter 1.5.4).

By law, the Service is not to allow activities that would detract from the Refuge's purposes. After careful consideration, the planning team determined that due to the small size of the Refuge and conflicts with other uses and Refuge management focus, waterfowl hunting could not be supported as a priority public use. In particular, it was determined that the hunting activity would result in unacceptable impacts to migratory birds. These impacts would likely include disturbance and displacement of shorebirds and other migratory birds during the winter months when waterfowl hunting occurs. The Refuge is too small to allow the establishment of wildlife sanctuary areas in key habitats that would be separate from hunting areas. Allowing hunting on the Refuge would diminish the wildlife values of the mudflats and open water habitats during critical migration and wintering periods when birds rely upon undisturbed habitat for feeding and resting. In addition, existing high-quality wildlife observation, wildlife photography, and education programs would be negatively affected due to the small size of the Refuge and proximity of Refuge trails. Waterfowl hunting was considered but not implemented for similar reasons during the development of the Management and Development Plan for Grays Harbor NWR (USFWS 1990).

***Boating:*** The planning team considered boating on the Refuge and determined that boating is not an appropriate use due to the Refuge’s overall size and the potential for disturbance to migratory birds using the mudflat and open water habitats. Feasible areas for boating are already very limited on the Refuge due to shallow water conditions and extreme tidal fluctuations. The Refuge makes up less than 2 percent of the overall Grays Harbor estuary, and many boating opportunities already exist in areas more conducive to safe boating. Because of the small size of potential boating areas, a single boat could flush much of the migratory birds using open waters. In addition, boating would conflict with wildlife observation, wildlife photography, and education activities by disturbing wildlife in the limited viewing areas that are available to trail users. Therefore, the current closure to boating on the Refuge will be maintained. Boating was considered but not implemented for similar reasons during the development of the Management and Development Plan for Grays Harbor NWR (USFWS 1990).

***Fishing:*** The planning team considered fishing within the Refuge boundary. Habitat within the Refuge is marginal for fishing opportunities due to the shallow waters and extreme tidal fluctuations. Similar to boating, it was determined that the activity would cause too much disturbance to migratory birds using the limited waters of the Refuge. Fishing would also negatively affect those participating in wildlife observation, photography, and education activities on Refuge trails. Fishing was not implemented for similar reasons during the development of the Management and Development Plan for Grays Harbor NWR (USFWS 1990).

### **2.2.2 Black River Unit of Billy Frank Jr. Nisqually National Wildlife Refuge**

***Waterfowl Hunting:*** Waterfowl hunting under state regulations occurs within the Black River channel. During the public scoping period, the Service received comments requesting opportunities to hunt waterfowl within the Black River Unit (see Appendix J).

When considering wildlife-dependent public uses on any refuge or refuge unit, we must determine if we can provide high-quality experiences that are compatible with the purposes of that refuge or unit. The term “quality” is identified as a baseline attribute for any wildlife-dependent, priority public use activity being considered. Considerations for quality waterfowl hunting on the Black River Unit included: 1) hunter safety; 2) hunter ethical behavior; 3) uncrowded conditions; 4) reasonable harvest opportunities; 5) a clear understanding about which areas are open and closed to hunting; and 6) minimal conflict between hunters and other visitors. Distance and access to the site also would have to be feasible in a reasonable timeframe. In addition, local landowners live along the river shoreline in some locations, and the need to avoid conflict and maintain a safety buffer was an important factor. Rare or listed species and their associated habitats were also considered regarding potential waterfowl hunting on Unit lands.

The planning team carefully considered the feasibility of waterfowl hunting on Unit lands that met these quality parameters. Both walk-in and boat-in hunting on Unit lands along the river bank were considered but not further developed because of the difficulty in accessing the bank due to dense vegetation, the difficulty in maintaining access to the bank, and the presence of the federally threatened Oregon spotted frog.

North of 110<sup>th</sup> Avenue, the river channel is extremely narrow, averaging 10 to 25 feet wide depending on location. Most of the narrow river channel is bounded on both sides by tall, impenetrable vegetation lining the river banks, including dense shrub scrub. These conditions make it extremely difficult-to-impossible to ensure that birds would drop in the river rather than become lost in the dense vegetation after being shot. The vegetation is too impenetrable even for dogs in most

places, which would result in the loss of many downed birds. A waterfowl hunting program under these conditions would result in the waste of natural resources (50 CFR 20.25), violate the Migratory Bird Treaty Act, and not provide a quality hunting experience on Unit lands. Other considerations include safety issues and the potential for user conflicts with boaters, including kayakers and canoeists.

Waterfowl hunting in Unit lowlands and wetlands from the southern boundary of the Unit to 110<sup>th</sup> Avenue was considered and not further developed because the river corridor is within critical habitat for the federally threatened Oregon spotted frog and harbors one of the core populations within western Washington. Additionally, local landowners live along the river shoreline in some locations and this was an important consideration to avoid conflicts and maintain a safety buffer. Because of all of these considerations, it was determined that a safe and quality waterfowl hunting program is not feasible under current conditions and this activity was not selected for further analysis.

The planning team has noted the possibility of future Unit acquisitions within the Black River area, where more suitable lands which could support a waterfowl hunting program could potentially be acquired. Unit-based waterfowl hunting would be reconsidered, and a separate planning and compliance effort could follow such future acquisitions.

**Fishing:** Fishing under state regulations occurs within the Black River channel. During the public scoping period, the Service received comments requesting opportunities to fish from Unit lands within the Black River, including the river bank (see Appendix J).

Fishing is a wildlife-dependent public use and therefore receives special consideration in planning (see Chapter 1.5.4). When considering fishing opportunities on any refuge or refuge unit, programs are designed to provide high-quality experiences that are compatible with the purposes of that refuge or unit. In this CCP process, fishing on Unit lands within the Black River was considered but not further developed because these parameters would not be met due to the difficulty in accessing the bank because of its dense vegetation, the difficulty in maintaining access to the bank, and the presence of the federally threatened Oregon spotted frog.

Within the Unit, the bank and adjacent areas are occupied by dense stands of shrubs or are dominated by emergent wetlands making foot access to the river extremely difficult. Successfully casting from within the shrubs would be difficult. Traveling through and fishing from the shrubs or wetlands would increase the potential for wildlife disturbance. Additionally, boat landing on the river bank for fishing would involve dragging boats in and out of the water and could cause erosion and turbidity. Fishing for crayfish usually involves use of traps, which have the potential to also catch federally threatened Oregon spotted frogs or possibly Olympic mudminnows, a State-sensitive species. For these several reasons, fishing for shellfish, fishing from the banks or in the tributaries of Black River, and fishing near the boat launch site were considered but not further developed in the CCP.

**Boat Launch at 110<sup>th</sup> Avenue:** Boat launch sites are an important component to providing safe, feasible public access on the Black River. The planning team examined the WDNR-owned boat launch site and the surrounding Unit lands on 110<sup>th</sup> Avenue. The planning team contacted WDNR and discussed various issues regarding the upgrade of the former boat launch and parking area. WDNR no longer maintains a boat launch at this site due to infrastructure problems with flooding, costs, and the difficulty in maintaining a launch site there. Issues include extreme flood events that regularly wash out any structures or docks; the soft substrate that requires constant gravel and fill to maintain a small, existing parking and access area; safety; security due to vandalism and theft; and feasibility and costs to maintain safe facilities and access. This site was physically limited in terms of

road clearance, parking space, boat launch size, and safety. Parking or public access on Unit lands adjacent to 110<sup>th</sup> Avenue is not feasible. These areas are more distant from the river and separated from the river channel by heavy brush and shallow wetlands. It was determined the site at 123<sup>rd</sup> Avenue offered the best opportunity to provide a high-quality, safe, and accessible parking and boat launch site in partnership with Thurston County (see Objective 5.2).

## **2.3 Alternative Descriptions**

### **2.3.1 Features Common to All Alternatives**

Under the National Wildlife Refuge System, Grays Harbor Refuge and the Black River Unit are managed to conserve native fish, wildlife, plants, and their habitats, and to provide opportunities for compatible, wildlife-dependent public uses. All alternatives contain some common features. The Refuge and the Unit would continue to conduct core management programs and follow policies regardless of which CCP alternative is selected for implementation. To reduce the length and redundancy of the individual alternative descriptions, following are brief descriptions of the principles and programs that are common to all alternatives evaluated in this CCP.

***Implementation subject to staffing and funding availability:*** As funding becomes available, actions described in the CCP would be implemented at the Refuge and the Unit over a period of 15 years. Draft project priorities and projected staffing and funding needs are included in Appendix C, although special funding initiatives, unforeseen management issues, and other budget issues would likely require adjustments to the implementation schedule in the future. The Refuge and the Unit would continue to work with partners to implement the CCP by sharing science, providing updates on successes and challenges, initiating discussions, encouraging participation, and hosting working groups. The CCP will be reviewed at least every 5 years and updated as necessary.

***Appropriateness and compatibility:*** Consistent with relevant laws, regulations, and policies, prior to allowing any public use of the Refuge or the Unit, including commercial use, each such use will first need to be found appropriate and determined compatible (16 U.S.C. 668dd-668ee, 50 C.F.R. 25, 26, and 29; and 603 FW 1 and 2). Appropriateness and compatibility are further discussed in Appendices A and B.

***Adaptive management:*** Based on 522 Departmental Manual (DM) 1 (Adaptive Management Implementation), Refuge and Unit staff shall utilize adaptive management for conserving, protecting, and, where appropriate, restoring lands and resources. Within Title 43 of the Code of Federal Regulations (CFR) 46.30, adaptive management is defined as a system of management practices based upon clearly identified outcomes, where monitoring evaluates whether management actions are achieving desired results (objectives). Adaptive management is based on the recognition that ecosystem function is inherently complex and often results in data gaps. Adaptive management emphasizes learning while doing based upon available scientific information and best professional judgment, considering site-specific biotic and abiotic factors on refuge lands and waters. In the presence of accelerated climate change, adaptive management is an increasingly important management decision process. The Refuge and the Unit will employ adaptive management as a standard operating procedure under all alternatives. Part of measuring the success of and adaptively managing the Refuge and the Unit includes 5-year reviews and a 15-year revision of the CCP, which will be initiated by the Service and involve many of the same steps and engagement with partners and the public as the original CCP.

**Biological integrity, diversity, and environmental health:** The Administration Act directs the Service to “ensure that the biological integrity, diversity, and environmental health of the [NWRS] are maintained for the benefit of present and future generations of Americans . . . .” The policy is an additional directive for the Service to follow while achieving refuge purposes and the Refuge System mission. It provides for the consideration and protection of the broad spectrum of native fish, wildlife, and habitat resources found on the Refuge and the Unit. When evaluating the appropriate management direction for the Refuge and the Unit (e.g., in compatibility determinations), the Service will use sound professional judgment to determine the Refuge’s and the Unit’s contributions to BIDEH at multiple landscape scales. Sound professional judgment incorporates field experience, knowledge of Refuge or Unit resources, an understanding of a Refuge’s or Unit’s role within the ecosystem, applicable laws, and best available science, including consultation with others both inside and outside the Service. The policy states that “the highest measure of biological integrity, diversity, and environmental health is viewed as those intact and self-sustaining habitats and wildlife populations that existed during historic conditions.”

**Climate change:** As stated in DOI’s Secretarial Order 3226 and the Service’s Climate Change Strategic Plan, the Service considers and analyzes climate change in its decisions, long-range plans, and other activities. Refuge habitats and wildlife populations are directly and indirectly sensitive to changing climatic conditions, especially temperature and precipitation, and the resultant effects on physical environments (e.g., hydrology, sea levels, ocean chemistry).

The combined changes can affect a refuge’s habitats and species directly (e.g., sea level rise, timing of migratory bird arrival, changes to plant flowering phenology, changes in species’ ranges and physiology), and indirectly (e.g., added vulnerability to other stressors including increasing invasive species and pathogens). Predicting biological response at the population level, however, requires complex, sophisticated data collection and modeling that must 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 and Unit resources will be used to assess potential changes or enhancements to management actions and techniques and their timing, using the adaptive management approach described above.

The Refuge and the Unit will participate in and contribute to climate change assessment efforts, including those underway at a landscape scale. Participation in the North Pacific Landscape Conservation Cooperative (LCC) will provide Refuge and Unit staff with a means to tie-in with a larger-scale assessment of the impacts of climate change. LCCs are formal, integrated, science-management partnerships between the Service, Federal agencies, states, Tribes, NGOs, universities, and other entities to address climate change and other biological stressors. LCCs provide science support, biological planning, conservation design, research, and design of inventory and monitoring programs. As guided by future empirical or projected climate impacts, relevant management objectives and strategies will be adjusted to assist in enhancing the Refuge’s and Unit’s resources’ resiliency to climate change.

**Reduce the Refuge’s and Unit’s carbon footprints:** The Service has developed a strategic plan for responding to accelerating climate change (USFWS 2010) and an action plan that outlines 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 and the Unit will work toward this goal by replacing their current vehicles with more fuel-efficient vehicles and by building appropriately sized, energy-efficient facilities, as funding becomes available. The Refuge and the Unit will reduce the carbon

footprint of land management activities by using energy-efficient techniques, where feasible and in line with management goals. The Refuge and Unit will also explore ways of offsetting any remaining carbon balances, such as carbon sequestration.

***Complete land acquisition within the current approved boundaries:*** Based on the availability of funds, the Service will continue to negotiate with willing sellers to acquire lands within the existing approved Refuge and Unit boundaries, through fee title acquisition, easement, or other land conservation tools.

***Landscape-scale conservation:*** The Refuge System’s strategic vision document, *Conserving the Future: Wildlife Refuges and the Next Generation*, emphasized the importance of using a “scientific, adaptive, landscape-level approach to conserving, managing, and restoring refuge lands and waters, and facilitate conservation benefits beyond our boundaries” (USFWS 2011). Following from this vision, the Service’s strategic growth policy (602 FW 5) described a landscape planning process termed landscape conservation design (LCD) where a partnership, including the Service, along with other local, State, and Federal government agencies, tribal governments, and other interested parties would identify priority conservation species; develop measureable conservation targets; assess current and projected landscape patterns, processes, and stressors; depict spatially-explicit desired future conditions; and produce a suite of management strategies for achieving those conditions on a landscape scale.

In fall 2015, the North Pacific LCC launched an LCD project within the lower Columbia River basin and adjacent outer coasts of Oregon and Washington, including Grays Harbor Refuge. The Black River Unit would be included within the scope of a separate, future landscape planning process. Under all alternatives, the Service will participate in landscape planning processes for both the Refuge and the Unit. Outcomes from the landscape planning processes will identify the Service’s role in conservation efforts within the ecoregion and inform potential strategic growth, land protection, and management decisions for the Refuge and Unit. As landscape-scale planning is a non-regulatory process, additional evaluation, planning, and compliance will need to occur prior to any implementation of strategies identified through any landscape planning process.

***State, local, and interagency coordination:*** Under all alternatives, the Service will continue to maintain regular discussions with Washington Department of Fish and Wildlife (WDFW) and the Department of Natural Resources (WDNR), among other agencies and entities. Topics for discussion include implementing CCP projects, threatened and endangered species, landscape-scale planning, land protection planning, managing wildlife, and recreational activities and access.

***Tribal coordination:*** The Service will coordinate and consult with Tribes on a government-to-government basis regarding issues of shared interest. The Service seeks assistance from Tribes on issues related to cultural resources, education and interpretation, natural resource programs, and the National Historic Preservation Act (NHPA).

***Invasive species control:*** Because invasive plants and animals pose threats to all Refuge and Unit wildlife and habitat, control of invasive species will be a high priority management activity in all alternatives. Species that limit the Refuge’s and the Unit’s abilities to provide high-quality habitat for refuge purposes and trust species will be controlled to the degree that funding and staffing permit. The magnitude of invasive species problems at the Refuge and the Unit 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 invasive species that are pervasive on Refuge and Unit lands are the subject of long-term control efforts and will continue to be a high priority for

Refuge and Unit resources. The Early Detection Rapid Response model will be used to 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. The Service will embark on a systematic effort to eradicate, contain, or control newly discovered invasive species and isolated infestations of a previously established, nonnative species, while the infestation is still localized. Invasive species control will be initiated prior to or concurrently with any habitat restoration efforts. Regardless of whether the invasive species is well established or newly introduced, it will be essential that the Refuge and the Unit 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. The Integrated Pest Management Plan is included in this CCP (See Appendix G).

***Integrated pest management:*** In accordance with DOI and Service policies 517 DM 1 and 569 FW 1, an integrated pest management (IPM) approach will be used, where practicable, to eradicate, control, or contain pest and invasive species (herein collectively referred to as pests) on Refuge and Unit lands. IPM uses methods based upon effectiveness and cost, with minimal ecological impacts to nontarget species and the Refuge or Unit 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 or Unit lands, the most specific (selective) chemical available for the target species will be used unless considerations of persistence or other environmental or biotic hazards would preclude it. However, pesticides with substantial effects to species or the environment may be used in order to protect human health and safety. In accordance with 517 DM 1, pesticide usage will be further restricted because only pesticides registered with the U.S. Environmental Protection Agency (EPA) in full compliance with the Federal Insecticide, Fungicide, and Rodenticide Act and as provided in regulations, orders, or permits issued by EPA may be applied on lands and waters under Refuge and Unit jurisdiction. Appendix G provides detailed documentation of the IPM program and its potential implementation and evaluation.

***Mosquito control:*** Mosquito populations on Refuge and Unit lands will be allowed to fluctuate and function unimpeded unless they jeopardize wildlife or human health and safety. We recognize mosquitoes are native invertebrates inhabiting aquatic habitats, which provide a forage base for fish and wildlife, including migratory birds. To protect human and wildlife health and safety, mosquito monitoring will be allowed under a Special Use Permit (SUP) by the State or a local vector control agency as needed. Pesticide treatments (larvicides, pupacides, or adulticides) are not currently conducted but will be considered on Refuge or Unit lands only if local, current population monitoring or disease surveillance data indicate Refuge- or Unit-based mosquitoes jeopardize wildlife or human health and safety. Mosquito treatments will only be allowed following completion of a compatibility determination, disease contingency plan, and in accordance with IPM principles applicable to all pests (unless there is a mosquito-borne, health-related emergency). Proposed pesticide uses for mosquito control will utilize appropriate and practical best management practices, where possible, given potential effects documented in Chemical Profiles (see Appendix G).

***Regulatory compliance:*** This draft CCP/EA provides descriptions of the affected environments and resources, potential environmental consequences of certain types of activities, and general themes for management alternatives. Consequently, this draft CCP/EA can be incorporated by reference into future proposals to avoid lengthy recital and repetitive information. However, since this draft CCP/EA is programmatic in many areas, it may not contain the necessary detail on every future action outlined to adequately present and evaluate all physical, biological, and socioeconomic impacts. Some of these details are dependent on funding and implementation schedules. Therefore,

prior to implementation, all 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 appropriate evaluations and documentation under NEPA, evaluation and consultation required by Section 7 of ESA, and review and consultation required by Section 106 of the National Historic Preservation Act (NHPA). Approved Section 7 consultation processes will be followed for areas potentially affecting listed species or designated critical habitat on a site-specific basis as project implementation occurs. Any new ground-disturbing projects will undergo a review under Section 106 of NHPA.

***Participation in planning and review of regional development activities:*** The Service will actively participate in planning and studies pertaining to future industrial and urban development, transportation, recreation, contamination, and other potential concerns that may affect the Refuge's or the Unit's resources. The Service will continue to cultivate working relationships with county, State, and Federal agencies to stay abreast of current and potential developments. The Refuge and the Unit will utilize outreach and education as needed to raise awareness of their resources and dependence on the local environment.

***Refuge revenue sharing:*** Annual payments to local county governments under the Refuge Revenue Sharing Act (16 U.S.C. 715s) will continue according to the established formula and are subject to congressional appropriations. Total payments made to local counties are listed in Chapter 5 and in Appendix C: Implementation.

***Volunteer opportunities:*** Volunteer opportunities are key components of the successful management of public lands, and are vital to Refuge and Unit programs, plans, and projects, especially in times of static or declining budgets. Currently the Nisqually National Wildlife Refuge Complex, which includes Grays Harbor Refuge and the Black River Unit, makes extensive use of volunteers in invasive species control, habitat restoration, education, and visitor services programs. In the future, successful implementation of native habitat restoration, survey and monitoring activities, and environmental education and interpretation programs will require the use of partnerships and volunteers. The volunteer program will be managed through the Refuge Complex headquarters volunteer program.

***Partnerships:*** Partnerships on the Refuge and Unit 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, Tribes, organizations, and businesses.

***Transportation coordination:*** Roads, bridges, parking areas, and trail systems play a vital role in providing access to the public for compatible, wildlife-dependent recreation opportunities. Under all alternatives, the Service will look for opportunities to collaborate with the Washington Department of Transportation, Department of Public Works, and the local communities to maintain and improve safe and appropriate transportation access between gateway cities and the Refuge and the Unit.

***Inventory and monitoring:*** Inventory and monitoring (I&M) policy (701 FW 2) requires refuges to prepare I&M plans. Refuge I&M plans have two sequential phases (parts):

1. A prioritized list of surveys for approval by the Refuge Supervisor.
2. Individual protocols based upon the finalized list of surveys.

An I&M step-down management plan will be developed for the Refuge and the Unit within 3 years of CCP completion. See also Goal 4.

**Research:** The Refuge and the Unit will continue to work with regional experts to share information and expertise on habitat management and restoration techniques. Collaboration with local universities, NGOs, State and local agencies, and others to conduct research that will advance the science of habitat management and restoration on Refuge and Unit lands will be an important part of the science program. SUPs will be issued to permit research that furthers the mission of the Refuge System under the stipulations specified in the Research Compatibility Determination (see Appendix B).

**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 found in Appendix D. This review concluded that neither of the Refuge or the Unit meets the requirements for wilderness designation.

**Step-down management plans:** The CCP provides guidance in the form of goals, objectives, and strategies for several Refuge and Unit program areas, but may lack some of the specifics needed for implementation. Regardless of the alternative selected as the final management plan for the Refuge and the Unit, several subsequent, or step-down, plans will be developed.

All step-down management plans require appropriate NEPA compliance, and implementation may require additional Federal, State, and county permits. Project-specific plans, with appropriate NEPA compliance, may be prepared outside of these step-down management plans. The following step-down management plans have been identified for the Refuge and/or the Unit:

- Inventory and Monitoring Plan;
- Wildland Fire Management Plan revision;
- Habitat Management Plan.

**Refuge fire management:** Fire Management Plans were finalized for the Refuge and the Unit in 2003. Until revised, fire management actions will continue to be guided by the direction set forth in the plans.

**Law enforcement:** The goal of law enforcement on the Refuge and the Unit is to protect natural resources, maintain the safety and security of the visitors and employees, and protect facilities. Law enforcement activities will include patrols, when staffing allows, to establish and maintain an effective, professional, and courteous law enforcement presence to eliminate unauthorized uses. Coordination and fostering partnerships with local law enforcement agencies will be an important part of the law enforcement program. The Service will investigate reports of violations in a timely fashion. Preventive law enforcement through education, signing, and regulation information will be used as important measures of the program.

### **2.3.2 Features Common to All Alternatives at Grays Harbor National Wildlife Refuge**

**Maintenance and updating of existing facilities:** Periodic maintenance and updating of Refuge buildings and facilities will be necessary regardless of the alternative selected. Periodic updating of facilities is necessary for safety, accessibility, and support of staff and management needs.

Maintenance information is incorporated in the Service Asset Maintenance Management System. While new facilities are identified within this CCP, emphasis will also be placed on maintaining existing facilities.

***Nature center and other facilities planning:*** Public Law 100-406, which authorized the establishment of Grays Harbor National Wildlife Refuge in 1988, directed the Service to develop a management plan to include: 1) the construction of a visitor center suitable for year-round use with special emphasis in interpretative education and research; 2) viewpoints, boardwalks, and access; and 3) parking and other necessary facilities. With public involvement, the Grays Harbor National Wildlife Refuge Management Plan was completed in 1990; all of the public facilities listed above were included in the plan.

The Refuge has begun work on some of the facilities described in the 1990 Management Plan, including a parking area with an information kiosk along Airport Way; public access to wildlife viewing areas; and construction of the Sandpiper Trail, a mile-long boardwalk trail which provides safe access and viewpoints. Although the Refuge has not constructed a building as described in the Management Plan, the Refuge has provided educational opportunities to both local and outside communities through educational programming in local schools, Refuge field trips for educational groups, the annual Grays Harbor Shorebird and Nature Festival, and the annual Shorebird and Nature Festival Poster Contest.

In 2007, the Service developed a conceptual building design for a nature center and associated facilities based on standard designs for Refuge facilities. The proposed building was to be located within a 4-acre site along the east boundary of the Refuge and the west side of Paulson Road. The design included a small administrative space, medium-sized visitor facilities, and an environmental education module (see Appendix M for more details about the site-selection process, building design, and a preliminary site map). However, due to a lack of funding, these plans have not been implemented.

Support from partners to help fund, staff, and maintain a nature center is essential. Under all alternatives, the Service proposes to work with other agencies, current and new partners, the community, and others to review the current nature center plan and to evaluate other options, including alternate funding, sites, and designs, that could lead to a viable plan for the center. If constructed, the Refuge will work with partners to develop biological, ecological, and cultural education and interpretative content, as well as any associated facilities (e.g., trails, viewing platforms).

The Refuge is adjacent to a highway used by one million people a year who are recreating in Grays Harbor County and on the Olympic Peninsula. The local area serves as a gateway community to the Olympic Peninsula. The potential for reaching a portion of these visitors and providing wildlife- and Refuge-related information is high. Additional visitor facilities could be a draw and destination, enhancing nature-based travel and experiences that brings new people to the Refuge and the local area. The additional facilities could provide a home for the Refuge's environmental education program, allowing students from the local area a place to extend classroom learning and enhance the outdoor experience, and would also strengthen ties with the community, partners, and volunteers associated with the Refuge.

In the interim, other improvements proposed under Goal 5 would provide additional and enhanced opportunities for visitors.

***Salt marsh restoration (berm removal):*** As part of the revised Nestucca Oil Spill Restoration Plan completed in 2004, the Service included project planning to remove an artificial berm located at the northwest portion of the Refuge. The berm removal will improve the quality of salt marsh habitat for shorebirds, other migratory birds, and wildlife. This restoration plan was included in the Revised Nestucca Oil Spill Restoration Plan and Environmental Assessment with a Finding of No Significant Impact (USFWS 2004). For more details on the restoration plans, see Objective 1.4.

***Sweetgrass harvesting:*** Historically, sweetgrass (*Schoenoplectus pungens*, formerly *Scirpus americanus*) was traditionally gathered and used by Native Americans for weaving baskets. Sweetgrass is an important cultural resource for many Tribes and an integral plant component of the salt marsh habitat. Sweetgrass stands are limited on the Refuge and concerns remain about the long-term health of this unique resource. The Refuge will continue to support this traditional use and cultural need and issue SUPs to Native American Tribal members for gathering sweetgrass. Permit stipulations are designed to provide long-term habitat protection and to sustain a thriving population of sweetgrass on the Refuge. Sweetgrass stands will also be available as a seed and plant source to establish new stands on Tribal lands as requested on a case-by-case basis (see Appendices A and B).

### **2.3.3 Features Common to All Alternatives at the Black River Unit of Billy Frank Jr. Nisqually National Wildlife Refuge**

***Removal of old buildings:*** The Black River Unit has several old, derelict buildings in need of removal. These include old barns, outbuildings, and houses that are in various states of disrepair and need to be demolished. Many have already been removed during the past 10 years. The remaining buildings are subject to trespass, vandalism, and other criminal activities, so these areas will remain closed to public access until building removal can be accomplished. These buildings will continue to be removed as funding becomes available. See Appendix C for further details on project priorities and estimated costs of removal.

***Protection of vegetation and natural processes:*** Woody vegetation, beaver dams, and other vegetation in the river channel provide cover and other important values for native fish, salmon, and other wildlife. Vegetation clearing for recreational purposes will not be allowed or conducted. Unit staff will continue to control invasive plants or conduct other habitat management practices needed to benefit river channel habitat as part of operating and managing the Unit.

***River channel habitat:*** The Service will work with WDNR to develop an interagency agreement, or similar instrument, that promotes cooperative management of the river channel between WDNR and the Service within the approved Unit boundary. Cooperative management will provide improved protection to fish and wildlife that use Unit and State-owned aquatic lands, provide improved habitat protection, allow the enforcement of Unit laws and regulations on the river channel, and define public access restrictions and management needed to provide improved wildlife protection from disturbance, while supporting high-quality, wildlife-dependent recreation opportunities. An agreement will benefit natural resources of interest to both agencies and strengthen the Service's partnership with WDNR. Cooperative management of the river channel will also contribute to achieving the Service's mission, Unit purposes, and help meet several goals by allowing the Unit to protect and better manage wildlife resources as well as meet the WDNR's objectives for the stewardship of State-owned aquatic lands.

### **2.3.4 Summary of Alternatives**

Each alternative describes a combination of management actions designed to achieve Refuge or Unit purposes, vision, and goals. These alternatives provide different ways to address and respond to management concerns, public and partner issues, and opportunities identified during the planning process. They also reflect the direction in the Refuge Administration Act, Service policies, and legal mandates outlined in Chapter 1. A short description of each alternative is presented next, followed by summary tables (Tables 2-1 and 2-2). The tables summarize the key differences between the current management activities and the preferred alternative. Habitat acreages are included in each objective.

Detailed descriptions of the management goals, objectives, and strategies for each alternative are presented next. Maps are presented for the Refuge and the Unit, including each of the two alternatives and habitat maps at the end of the document, in Appendix N.

#### **Alternatives for Grays Harbor National Wildlife Refuge**

##### ***Alternative 1 – No-Action Alternative***

The Refuge would continue to emphasize and promote the protection of Refuge habitats. Management actions include continuing with limited control of invasive species and monitoring of migratory bird use. Environmental education would continue to be a focus of the visitor services program. Existing visitor services, including wildlife observation, wildlife photography, and interpretation, would continue with the current facilities. No new facilities would be developed; however, planning for a new nature center would continue.

##### ***Alternative 2 – Preferred Alternative***

Habitat programs would continue as currently managed with greater emphasis and improvements on invasive species management and pursuing priority science inventory, monitoring, and research needs. The environmental education, interpretation, volunteer, and outreach programs would be enlarged and improved as staffing allows. In addition to continuing actions described under Alternative 1, the visitor services program would target facility improvements including improved parking, an expanded Sandpiper Trail, interpretive panels, and two viewing platforms.

#### **Alternatives for the Black River Unit of Billy Frank Jr. Nisqually National Wildlife Refuge**

##### ***Alternative 1 – No-Action Alternative***

Habitat management would continue to focus on monitoring and habitat management for the federally threatened Oregon spotted frog. There would be limited invasive species management and habitat management. Land acquisition efforts would continue as a priority for the Unit as funding allows. The Unit would not be open and no visitor services would be available.

##### ***Alternative 2 – Preferred Alternative***

Greater emphasis would be placed on enhancing and managing habitat, especially in wetland habitats, to benefit the Oregon spotted frog and migratory birds. Increased inventory, monitoring, and research would be used to guide management decisions to benefit fish and wildlife. These inventories would be used to evaluate whether to propose designation of a research natural area (RNA) to

improve protection and management of unique bog and wetland habitats. The Unit would be opened to public use, including wildlife observation, interpretation, and wildlife photography. Proposed facilities to support visitor services include a viewing platform with a short walking trail on the east side of Endicott Road and a vehicle pull-off area with interpretive signs for viewing wildlife on the west side of Endicott Road. The Service would establish a cooperative agreement with Thurston County to develop a boat launch, small parking area, and new kiosk and interpretive signs on the southeastern side of the 123<sup>rd</sup> Avenue bridge. Outreach and volunteer programs would be expanded as staffing allows.

**Table 2-1. Grays Harbor NWR Summary of Alternatives by Issue.**

Theme/Issue	Alternative 1 No-Action Alternative (Current Management)	Alternative 2 Preferred Alternative
<b>Estuarine Habitats</b>		
Tidal open water	Protect 723 acres of open water and channel habitat	Same as Alternative 1, plus conduct IPM program
Intertidal mudflats	Protect 497 acres of intertidal mudflats and maintain limited IPM program	Same as Alternative 1, plus increase IPM program
Tidal salt and brackish marsh	Protect 156 acres of tidal salt and brackish marsh habitat and maintain IPM program. Remove constructed berm and restore tidal circulation to 15–20 acres	Same as Alternative 1, plus increase IPM program
<b>Forest Habitat</b>		
Mixed forest	Protect 95 acres of mixed forest habitat and maintain limited IPM program	Same as Alternative 1, plus increase IPM program and additional partnerships to control knotweed
<b>Estuary and Ecosystem</b>		
Partnerships	Maintain current partnerships	Same as Alternative 1, plus enhance and develop new partnerships and initiatives for conservation purposes
<b>Inventories, Monitoring, and Research</b>		
Inventory and monitoring	Develop and implement an Inventory and Monitoring Plan; continue shorebird monitoring as it applies to Refuge management decisions	Same as Alternative 1, plus initiate and support additional monitoring opportunities and projects
Research	Continue support of research opportunities as they apply to Refuge management decisions	Same as Alternative 1, plus initiate and support research opportunities where they contribute to understanding shorebird habitat use, sedimentation rates, and the effects of climate change on shorebird habitat and shorebird ecology

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Theme/Issue	Alternative 1 No-Action Alternative (Current Management)	Alternative 2 Preferred Alternative
<b>Visitor Services</b>		
Welcoming and orientation	Maintain current facilities, signs, outreach materials	Same as Alternative 1, plus update signs and improve parking, visibility, and outreach materials
Wildlife observation and photography	Collaborate with Port of Grays Harbor to maintain access to the Sandpiper Trail and maintain current facilities	Same as Alternative 1, plus coordinate with Port of Grays Harbor and Federal Aviation Administration (FAA) to install additional viewing platforms on Refuge lands adjacent to the blacktop road; explore extension of the Sandpiper Trail spur; increase viewing opportunities at the parking area; and work with partners to consider the feasibility of a bike/pedestrian trail along Paulson Road
Interpretation	Maintain current interpretive panels and continue to support interpretation and provide guided walks during the Shorebird and Nature Festival	Same as Alternative 1, plus develop new interpretive panels for Sandpiper Trail and other viewing areas and work with partners to provide guided walks and other interpretive programs for the public
Environmental education	Contact and coordinate participation by teachers and students in Grays Harbor County in the Refuge's environmental education program; conduct annual Shorebird and Nature Festival Poster Contest; and maintain educator resources and trainings	Same as Alternative 1, plus hire a permanent education specialist and coordinate curriculum and additional programs throughout the county; explore ways to secure stable funding for an education coordinator; improve and expand teacher training opportunities
<b>Volunteer Program and Partnerships</b>		
Refuge volunteers	Maintain current training and volunteer opportunities	Same as Alternative 1, plus expand efforts to recruit and train volunteers to participate fully in Refuge programs
Partnerships	Maintain partnerships with existing groups, organizations, and agencies	Same as Alternative 1, plus identify new local partnerships to support visitor services programs

Theme/Issue	Alternative 1 No-Action Alternative (Current Management)	Alternative 2 Preferred Alternative
<b>Outreach</b>		
Outreach programs and events	Maintain current efforts with the Grays Harbor Shorebird and Nature Festival	Same as Alternative 1, plus identify new opportunities for programs and events in the community and develop ways to reach nontraditional audiences

**Table 2-2. Black River Unit Summary of Alternatives by Issue.**

Theme/Issue	Alternative 1 No-Action Alternative (Current Management)	Alternative 2 Preferred Alternative
<b>Aquatic Habitats</b>		
River channel habitat	Alongside WDNR, protect 7.5 miles of river channel habitat and maintain limited IPM program	Same as Alternative 1, plus increase IPM program; complete a Water Resources Inventory and Assessment
Tributary channel habitat	Protect 6–16 miles of tributary channel habitat and maintain limited IPM program	Same as Alternative 1, plus increase IPM program and habitat enhancement
Bog habitat	Protect 56 acres of bog habitat	Same as Alternative 1, plus conduct baseline inventories and Water Resources Inventory and Assessment; conduct IPM program; introduce rare plant species as appropriate; evaluate the designation of an RNA if warranted
Shrub swamp habitat	Protect 512 acres of shrub swamp habitat and maintain limited IPM program	Same as Alternative 1, plus increase IPM program
Riparian forest habitat	Protect 265 acres of riparian habitat and maintain limited IPM program	Same as Alternative 1, plus increase IPM program
Emergent marsh habitat	Protect 34 acres of emergent marsh habitat and maintain limited IPM program	Same as Alternative 1, plus improve habitat for Oregon spotted frog; increase IPM program
Seasonally flooded, nonnative grassland habitat	Protect 82 acres of seasonally flooded, nonnative grassland habitat and maintain limited IPM program	Same as Alternative 1, plus improve habitat for Oregon spotted frog; evaluate and enhance seasonally ponded areas and improve water management capabilities as needed; increase IPM program

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Theme/Issue	Alternative 1 No-Action Alternative (Current Management)	Alternative 2 Preferred Alternative
<b>Upland Habitats</b>		
Dry, nonnative grassland habitat	Protect 163 acres of nonnative grassland habitat and maintain limited IPM program	Same as Alternative 1, plus plant big leaf maples and/or Garry oaks where appropriate; enhance up to 15 acres (within the 163 acres) with native plants; increase IPM program
Mixed forest habitat	Protect 394 acres of mixed forest habitat and maintain limited IPM program	Same as Alternative 1, plus enhance 5–10 acres (within the 394 acres) and increase IPM program
<b>Watershed and Ecosystem</b>		
Partnerships	Maintain current partnerships	Same as Alternative 1, plus enhance and develop new partnerships and initiatives for conservation purposes
<b>Inventories, Monitoring, and Research</b>		
Inventory and monitoring	Develop and implement an Inventory and Monitoring Plan; continue inventory and monitoring projects as they apply to Refuge management decisions	Same as Alternative 1, plus initiate and support additional monitoring opportunities and projects
Research	Limited current research	Initiate and support research opportunities where they contribute to understanding of Unit resources and management
<b>Visitor Services</b>		
Welcome and orientation	No visitor facilities or outreach materials	Develop print and electronic media outreach materials; improve Unit visibility; install signs
Wildlife observation and photography and educational programs	No visitor facilities or environmental education programs	Construct vehicle pull-off area with interpretive signs for viewing wildlife on the west side of Endicott Road; install small parking area, kiosk, viewing platform, short walking trail on east side of Endicott Road; identify links to Regional Trail System in coordination with Thurston County; establish a cooperative agreement with the county to develop a boat launch, small parking area, and new kiosk and interpretive signs at 123 <sup>rd</sup> Avenue bridge; partner with local

Theme/Issue	Alternative 1 No-Action Alternative (Current Management)	Alternative 2 Preferred Alternative
		organizations to incorporate Unit messages into their programs
<b>Volunteer Program and Partnerships</b>		
Volunteer program	No volunteer program	Develop and promote a Unit volunteer program, including efforts to recruit and train volunteers
Partnerships program	No partnership program	Build community partnerships to support Unit programs

## 2.4 Goals, Objectives, and Strategies

Goals and objectives are the unifying elements of successful refuge and unit management. They identify and focus management priorities, resolve issues, and link to establishing purposes, Service policy, and the Refuge System mission.

A CCP describes management actions that help bring a refuge or a unit closer to its vision. A vision broadly reflects the refuge or unit purposes, the Refuge System mission and goals, other statutory requirements, and larger-scale plans as appropriate. 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.

In the development of this CCP, the Service has prepared an Environmental Assessment (EA). The EA evaluates alternative sets of management actions derived from a variety of management goals, objectives, and implementation strategies.

The goals for the Refuge and the Unit to be implemented over the next 15 years under the CCP/EA are presented on the following pages. Each goal is followed by the objectives that pertain to that goal. All goals are for the lifetime of the CCP unless otherwise specified. Some objectives pertain to multiple goals and have simply been placed in the most reasonable spot. Similarly, some strategies pertain to multiple objectives. The goal order does not imply any priority in this CCP. The Implementation Plan articulates the current Refuge and Unit priorities (Appendix C).

**Readers, please note the following:**

- 1) The objective statement indicates specific items that vary in the alternatives. How those items vary is displayed in the short table under each objective statement, as applicable.
- 2) If an objective is not in a particular alternative, a blank box indicates that this objective is not addressed in that alternative.

Finally, below each objective statement are the strategies that could be employed in order to accomplish the objectives.

- 1) Check marks alongside each strategy show which alternatives include that strategy.

- 2) If a column for a particular alternative does not include a check mark for a listed strategy, it means that strategy would not be used in that alternative.

### 2.4.1 Grays Harbor National Wildlife Refuge

***Goal 1. Protect, maintain, and restore estuarine habitats representative of the Grays Harbor ecosystem for the benefit of shorebirds, other migratory birds, fish, and a diverse assemblage of other native species.***

#### **Grays Harbor Refuge Objective 1.1: Protect and maintain tidal open water habitat**

Protect and maintain 723 acres of tidal open water habitat for the benefit of native fish, waterfowl, waterbirds, and other native wildlife.

Desired attributes of open water include:

- Marine water continually covering land regardless of tidal cycles
- Salinities ranging from 5 to 20 parts per thousand (ppt), varies seasonally
- Presence of phytoplankton, zooplankton, algae, and invertebrates
- Large woody debris brought in by storm events and tides
- Presence of patchy native eelgrass beds\*\*
- Minimal human disturbance
- High water quality
- ≤5% nonnative, invasive plants and animals\*\*

*\*\*Attributes identified in current and/or proposed inventory, monitoring, and research activities*

<b>Strategies Applied to Achieve Objective:</b>	<b>Alt 1</b>	<b>Alt 2</b>
Monitor and use appropriate IPM techniques, such as mechanical, physical, biological, and chemical methods (see Appendix G), to control invasive or undesirable plant or animal species.	✓	✓
Protect and promote natural processes that dictate habitat changes, including water depths.	✓	✓
Maintain and develop new partnerships to protect and promote the ecological integrity of Grays Harbor estuary (see Objective 3.1).	✓	✓
Coordinate with the U.S. Coast Guard, other agencies, and update the Grays Harbor Geographic Response Plan as necessary.	✓	✓

**Rationale:**

The open water habitat, prior to construction of the airport peninsula and diking and filling along the shoreline, was historically part of the larger open estuary. However, the long-term implications of these permanent changes to habitat and wildlife resources are not yet fully understood. Currently, open water habitat accounts for nearly 50 percent of the overall Refuge area (see Map 1).

Maintaining and protecting open water habitat is extremely important because it provides habitat for a variety of estuarine plants and animal species that live in the shifting waters and substrates of the

estuary. The area provides a large disturbance-free expanse for thousands of migrating birds needing food and rest. Submerged areas in the open water habitat are channels and sloughs, which function as pathways and foraging areas for a variety of rare and common fish species, including salmon, eulachon, lamprey, sea-run cutthroat trout, and steelhead. Submerged eelgrass beds serve as shelter for fish, provide food for fish and waterfowl, help reduce shoreline erosion, and capture sediments. Considered a vital element to the ecosystem, the Refuge staff would assess the health and abundance of this important plant species (see Objective 4.1).

Threats that have and could continue to further compromise the ecological integrity of this habitat and its inhabitants include sediment and water pollution, invasive species, and climate change. To identify and respond to threats of water pollution and invasive species within the estuary and adjacent watersheds, Refuge staff would work with partners such as the Chehalis Basin Partnership and the U.S. Coast Guard to assist with spill response planning, invasive and pest species control, and other protection efforts (see Objective 3.1).

Staff would also actively seek opportunities to develop new collaborative partnerships to address issues that affect the overall health of the ecosystem. Partnerships would focus on resource protection measures, such as short and long-term research opportunities to protect the estuary and its resources (see Objective 4.3).

**Grays Harbor Refuge Objective 1.2: Protect and maintain intertidal mudflat habitat**

Protect and maintain 497 acres of intertidal mudflat for shorebirds and native wildlife.

Desired attributes of intertidal mudflats include:

- 90 percent of the habitat is a large expanse of exposed mud, sand, and silt-flats at low tide that are approximately 80 percent free of rooted vegetation and support algae growth
- Tidal sloughs are present (cut into the mud substrate by natural tidal forces)
- Twice daily, tidally driven marine waters flood the mudflats between 0.0 and 9.0 feet NGVD (National Geodetic Vertical Datum)
- Tidal salinity ranges from 5 to 20 ppt, varies seasonally
- Marine water carries zooplankton, phytoplankton, algae, and fish throughout the estuary\*\*
- Presence of epibenthic and benthic invertebrate populations\*\*
- Patches of native eelgrass, exposed briefly during extreme low tides\*\*
- Large woody debris on mudflats (naturally occurring and continually changing with tides)
- Minimal human disturbance
- ≤ 2 percent coverage of key invasive plant species such as *Spartina*, *Phragmites*, yellow flag iris, and other nonnative, priority-target plants\*\*

\*\*Attributes identified in current and/or proposed inventory, monitoring, and research activities

<b>Strategies Applied to Achieve Objective:</b>	<b>Alt 1</b>	<b>Alt 2</b>
Participate in contaminant spill response exercises in Grays Harbor estuary and cooperate with spill response lead agencies as needed.	✓	✓
Monitor and use appropriate IPM techniques, such as mechanical, physical, biological, and chemical methods (see Appendix G), to control invasive or undesirable plant or animal species.	✓	✓

**Rationale:**

The greater Grays Harbor estuarine mudflats are among the most important feeding and resting areas for migratory birds along the west coast of the United States and in the Pacific Flyway. The importance of this habitat has led to the recognition of the greater Grays Harbor estuary as a Site of Hemispheric Importance in the Western Hemisphere Shorebird Reserve Network (WHSRN 2009) and as a Globally Important Bird Area (ABC 2010). The estuary supports large concentrations of migratory birds, including over 500,000 shorebirds a year (WHSRN 2009).

The Refuge contains 497 acres of intertidal mudflat habitat which is valuable habitat for migratory birds, juvenile fish, clams, and invertebrates. The configuration of the Refuge tidal mudflats are unique within the estuary, as they are slightly higher in elevation and are one of the last areas to flood by rising tides. Because the mudflats remain exposed 1 to 2 hours longer than other areas in the estuary they provide extended resting and foraging opportunities for migrating shorebirds.

Threats which have and could continue to further compromise the ecological integrity of this mudflat habitat include water pollution, invasive species, increased sedimentation (which encourages growth of vegetation on mudflats), and climate change. To identify and respond to threats, Refuge staff would continue to work with Federal, State, local, and Tribal agencies and community groups to expand and utilize partnerships critical to maintaining the estuary's health (see Objective 3.1).

Staff would continue shorebird monitoring, identification and control of priority invasive species and expand the development of monitoring and research opportunities. Increased research would be necessary to understand the implications of increased sedimentation rates and the effects of sea level rise resulting from climate change (see Objectives 4.1–4.3).

**Grays Harbor Refuge Objective 1.3: Protect and maintain tidal salt and brackish marsh habitat**

Protect and maintain existing 156 acres of tidal salt and brackish marsh habitat for native fish, shorebirds, waterfowl, waterbirds, passerines, and other wildlife.

Desired attributes of tidal salt and brackish marsh include:

- Salt tolerant vegetation usually occurring (between mean high water [MHW] and slightly above mean higher high water [MHHW]) or within tidal range of 9 to 13 feet NGVD
- Estuarine marine water (5 to 20 ppt), varies seasonally
- Brackish marsh waters ( $\leq 5$  ppt) are less saline because of freshwater inputs that usually come from upland drainages (freshwater streams and rivers)
- Tidal sloughs are present at varying depths and locations
- 25–100 percent herbaceous coverage of native salt marsh vegetation in low, mid-, and high salt marshes with species such as sand spurry, saltgrass, pickleweed, jaumea, lilaepsis, seaside arrowgrass, silverweed, Lyngby's sedge, sweetgrass, Baltic rush, and tufted hairgrass
- Brackish marsh plants include cattail and bulrushes
- Salt marsh vegetation density is based in part on tidal inundation frequency and duration
- Minimal human disturbance
- $\leq 2$  percent coverage of invasive plant species such as *Spartina*, *Phragmites*, yellow flag iris, and other nonnative, priority-target plants on the Refuge\*\*

*\*\*Attributes identified in current and/or proposed inventory, monitoring, and research activities*

<b>Strategies Applied to Achieve Objective:</b>	<b>Alt 1</b>	<b>Alt 2</b>
Monitor and use appropriate IPM techniques, such as mechanical, physical, biological, and chemical methods (see Appendix G), to control invasive or undesirable plant or animal species.	✓	✓
Establish full-time refuge manager position to manage day-to-day operations of the Refuge, including managing and restoring habitat, coordinating with partners, and managing facilities.		✓

**Rationale:**

The Refuge supports 156 acres of tidal salt and brackish marsh habitat. Tidal wetlands are of high ecological importance and are considered essential habitat for many marine and anadromous fish and migratory birds. Salt and brackish marshes provide food and nursery areas for numerous young fish, crabs, shrimp, clams, and other invertebrates. Migratory birds use these areas as breeding, feeding, and resting sites. In addition, the estuarine marshland supports large numbers of migratory waterfowl and shorebirds, which in turn provide an important prey base for raptors such as bald eagles and peregrine falcons. The salt and brackish marsh is functionally connected with mudflat and riverine habitats and acts 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.

In the Pacific Northwest, a large portion of estuarine habitat has been lost to diking, channeling, dredging, and filling. The state of Washington is estimated to have lost between 45 percent and 62 percent of its pre-settlement estuarine habitat (Aitkin 1998). Within Grays Harbor, approximately 3,840 acres of salt marsh habitat was lost to dredge material disposal (Recht 1998).

Issues and concerns for the overall health of the habitat include sedimentation, invasive species, and climate change. Research is necessary to determine the impacts of changing habitats, management options, and the effects of climate change (see Objectives 3.1 and 4.3). Monitoring sedimentation rates and vegetation response within the tidal salt and brackish marsh and mudflats is important to the understanding of the potential resilience of these habitats to sea level rise, storm surges, and flood events. Another threat to the vitality and health of the habitat includes the potential spread of invasive species such as *Spartina*, *Phragmites*, and knotweed. Refuge staff would continue to collaborate and work with partners (WDFW, WSDA Grays Harbor County Noxious Weed Board, Grays Harbor Public Utility District (GHPUD)) to reduce invasive species within the Refuge and estuary.

Staffing priorities would include establishing a refuge manager position to manage the day-to-day operations, manage restoration and habitat management projects, manage the expanded facilities operations, develop and expand partnership projects, and implement expanded visitor services programs.

**Grays Harbor Refuge Objective 1.4: Restore salt and brackish marsh habitat**

Restore then protect and maintain up to 20 acres of salt and brackish marsh for the benefit of juvenile fish, waterfowl, wading birds, shorebirds, and other native species.

Desired characteristics include:

- Full, unimpeded tidal function\*\*
- Infrequent total tidal inundation, except on highest of high tides
- Interspersion of connected tidal sloughs
- Vegetation usually occurring within tidal range of 9 to 13 feet NGVD dominated primarily by pickleweed, tufted hairgrass, seashore salt grass, seacoast angelica, gumweed, seaside plantain, small spikerush, seaside arrowgrass, and Lyngby's sedge\*\*
- ≤ 2 percent coverage of invasive plant species such as *Spartina*, *Phragmites*, yellow flag iris, and other nonnative, priority-target plants on the Refuge\*\*

*\*\*Attributes identified in current and/or proposed inventory, monitoring, and research activities*

<b>Strategies Applied to Achieve Objective:</b>	<b>Alt 1</b>	<b>Alt 2</b>
Monitor and use appropriate IPM techniques, such as mechanical, physical, biological, and chemical methods (see Appendix G), to control invasive or undesirable plant or animal species.	✓	✓
Develop partnerships to secure funding for restoring salt and brackish marsh.		✓
Restore salt and brackish marsh by removing the berm and reconnecting tidal channels. See also Section 2.3.1, Features Common to All Alternatives.	✓	✓

**Rationale:**

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), the estuarine wetlands would maintain itself with very little or no input from land managers. To improve the quality and complexity of 15–20 acres of salt and brackish marsh habitat for fish and wildlife, the Refuge would remove a berm in the northeast portion of the Refuge. The berm was originally constructed to retain disposed dredge spoils that were deposited there until the 1970s (see Map 1). This restoration project was identified, developed, and approved in the revised 2004 Nestucca Oil Spill Plan (USFWS 2004).

The berm has been breached, but it prevents full tidal penetration and evacuation in the salt marsh habitat except during the highest high tides and flood events. This inhibition of tidal flow reduces the quality and complexity of saltmarsh habitat, contributes to deep channeling of the slough, and may be creating a ponding problem when the floodwaters recede, trapping fish and other aquatic organisms. Berm removal would allow a natural ebb and flow and restore function to tidal waters, improving the habitat value for marine species, migratory birds, and terrestrial wildlife.

Staff would continue to seek project funding and develop partnerships to implement this project. The project would include identifying, monitoring, and managing invasive plant species. The Service would coordinate with Federal, State, and county agencies on restoration design review.

**Goal 2. Protect and maintain upland habitat representative of the Grays Harbor ecosystem for the benefit of migratory passerines and other wildlife.**

**Grays Harbor Refuge Objective 2.1: Protect and maintain forest habitat**

Protect and maintain 95 acres of forest habitat for migratory passerines, landbirds, and native wildlife.

Desired attributes of this habitat include:

- 75–100 percent canopy cover of native trees such as red alder, willow species, cascara, Oregon ash, Pacific crabapple, and big leaf maple with thick lichen and moss coverage
- ~30 percent cover of native deciduous shrubs such as red elderberry, osoberry, twinberry, thimbleberry, salmonberry, and spirea
- >30 percent herbaceous cover consisting of native forbs and ferns such as sword and lady ferns, horsetail species, slough sedge, and *Galium*
- Natural succession to mixed forest to occur over time
- Minimal human disturbance
- <2 percent coverage of knotweed and other nonnative priority-target plants\*\*

*\*\*Attributes identified in current and/or proposed inventory, monitoring, and research activities*

Strategies Applied to Achieve Objective:	Alt 1	Alt 2
Monitor and use appropriate IPM techniques, such as mechanical, physical, biological, and chemical methods (see Appendix G), to control invasive or undesirable plant or animal species.	✓	✓
Partner with GHPUD, Grays Harbor County, and Grays Harbor County Noxious Weed Board to control encroaching knotweed along State Highway 109 (see Objective 3.1).		✓

**Rationale:**

The Refuge protects 95 acres of forest habitat which provides for a variety of neotropical migratory birds and small mammals. Management of this habitat would continue to focus on forest health, protection, and maintaining natural succession.

Resource threats influencing the future health of the forest and its wildlife resources include undesirable invasive plant species such as knotweed, *Phragmites*, Scotch broom, and blackberry. The Service uses a variety of control methods because different invasive species require specific techniques for control to be effective (see Appendix G).

Continued monitoring and treatment of invasive species would be maintained as staffing and funding allows. Refuge staff would build partnerships and collaborate with GHPUD, Grays Harbor County, and Grays Harbor County Noxious Weed Board to target removal of encroaching knotweed along State Highway 109.

**Goal 3. Contribute to the protection and long-term environmental health of the Refuge and greater Grays Harbor estuary and ecosystem.**

**Grays Harbor Refuge Objective 3.1: Develop and strengthen partnerships**

The Refuge would initiate, develop, and continue to strengthen existing partnerships with interested groups for the benefit of the long-term environmental health of native wildlife and their habitats.

Partnership actions include:

- Working with and involving local communities, universities, landowners, NGOs, Tribes, agencies, and other interested parties
- Identifying the Service’s role in conservation efforts with the focus on partnerships that provide support for natural resources
- Utilizing existing and supporting new eco-regional plans and priorities
- Working with and assisting others in the recovery of threatened and endangered species
- Considering habitat vulnerabilities and stressors (e.g., climate change, habitat fragmentation, invasive species, pollution)
- Working with others and assisting with management objectives for protecting and researching shorebird habitat \*\*
- Considering and participating in climate change initiatives and research\*\*

*\*\*Attributes identified in current and/or proposed inventory, monitoring, and research activities*

<b>Strategies Applied to Achieve Objective:</b>	<b>Alt 1</b>	<b>Alt 2</b>
Through a collaborative LCD process, work with partners (State, county, Tribes, NGOs, and others) to identify the Service’s role in conservation efforts in the Grays Harbor estuary ecosystem and surrounding habitats.	✓	✓
Maintain a strong partnership with the Port of Grays Harbor to further cooperation and protection of Grays Harbor estuary resources and the Refuge.	✓	✓
Coordinate with other natural resource agencies and interested partners to develop collaborative monitoring projects important for the Grays Harbor estuary, including the Refuge.		✓
Coordinate with the spill response agencies, Port of Grays Harbor, other Federal and State agencies, and appropriate partners to quickly mobilize a spill response, protect Refuge lands, and reduce impacts when possible following Geographic Response Plan procedures.	✓	✓
Participate in the Chehalis Basin Partnership, Chehalis Basin Weed Partnership, Pacific Birds Habitat Joint Venture, Marine Resources Committee, Nearshore and Estuarine Partnership, and other existing partnerships to further the protection of the Grays Harbor estuary and native habitats.	✓	✓

<b>Strategies Applied to Achieve Objective:</b>	<b>Alt 1</b>	<b>Alt 2</b>
Work with partners to coordinate control or monitoring of invasive species with appropriate IPM techniques, such as mechanical, physical, biological, and chemical methods (see Appendix G), to control invasive or undesirable plant or animal species.		✓
Coordinate with partners and support efforts to survey, control, and monitor <i>Spartina</i> and <i>Phragmites</i> in the greater Grays Harbor estuary as well as in the Refuge.	✓	✓
Work with GHPUD, Grays Harbor County, and Grays Harbor County Noxious Weed Board to control knotweed along State Highway 109.		✓
Share training opportunities and information with partners, the public, agencies, groups, and landowners.		✓
Communicate with landowners, recreational users of the estuary, and the public on the threats of invasive plants and animals and methods of reducing and controlling infestations.		✓
Provide technical and other assistance to partners working to restore natural resource lands in the Grays Harbor estuary.		✓
Work with partners to assess lands within the Grays Harbor estuary to identify potential alternative habitats appropriate for shorebirds in relation to future sea level rise.		✓
Work with partners to study environmental factors that are climate change related stressors (e.g., changes to hydrology and water chemistry) and their impacts on Refuge habitats and species. See Objectives 4.1–4.3.		✓
Establish a refuge operations specialist or wildlife biologist position that would focus on maintaining, protecting, and restoring lands, and working with partners.		✓

**Rationale:**

The habitats within the Refuge represent less than 2 percent of the overall Grays Harbor estuary. The Service recognizes that it will not be able to achieve many of the major conservation goals for the long-term environmental health of the Refuge and greater Grays Harbor estuary and ecosystem by working only within the existing Refuge boundary. Protected Refuge habitats currently provide substantial conservation benefits to shorebirds, threatened and endangered species, anadromous fish, migratory birds, and other native wildlife, but are vulnerable to a variety of landscape-scale threats such as climate change, sea level rise, invasive species, and pollution.

Strong collaborative partnerships and public education would enable the Service to achieve its vision and goals for the Refuge and the Grays Harbor estuary. Cooperative efforts with key partners would greatly further protecting and restoring habitat, watershed efforts, and education.

Developing and coordinating information needs in support of the health of the estuary resources would include expanded inventory, monitoring, and research. Refuge staff would provide technical assistance to partners as appropriate with continued participation in spill response planning and invasive species control (*Spartina*, *Phragmites*, knotweed). Monitoring and research related to climate change-related stressors would help inform adaptation strategies at the Refuge, and potentially, a larger landscape scale.

Establishment of a refuge operations specialist position or wildlife biologist position would benefit the natural resources of the estuary by providing coordination with partners on a variety of projects including inventory, monitoring, and research activities, habitat restoration and enhancement projects, invasive species control, and planning.

***Goal 4. Collect scientific information (inventories, monitoring, and research) necessary to support adaptive management decisions.***

**Grays Harbor Refuge Objective 4.1: Inventory**

Conduct scientific inventories to provide information regarding the status of Refuge resources and better inform resource management decisions. These scientific inventories and surveys would contribute to developing Refuge resource objectives. They would also be used to facilitate habitat restoration through selection of appropriate habitat management strategies based upon site-specific conditions.

These inventory activities would have the following attributes:

- Inventory habitats, species, and species groups according to the Refuge’s approved I&M Plan and associated protocols
- Use of accepted standards, where available, for completion of inventories
- Scale and accuracy of inventories would be appropriate for developing and implementing Refuge habitat and wildlife management actions
- Data collection techniques should have minimal animal mortality or disturbance and minimal habitat destruction
- Proper cleaning of investigator equipment and clothing and quarantine methods, where necessary, would minimize the potential spread or introduction of invasive species and disease

Strategies Applied to Achieve Objective:	Alt 1	Alt 2
Within 3 years of CCP completion, develop and implement an I&M Plan that provides the management rationale, timing, and costs for conducting Refuge surveys; lists the prioritized surveys; identifies the surveys selected for implementation; and documents the protocols that describe the survey objectives and methods.	✓	✓
Seek funding and develop or strengthen partnerships to accomplish priority baseline inventories (primarily focused on determining presence or absence) and mapping species and habitats.		✓

<b>Strategies Applied to Achieve Objective:</b>	<b>Alt 1</b>	<b>Alt 2</b>
Conduct inventory to gather data regarding year-round fish presence or absence in Refuge tidal open water, inundated mudflats, and inundated saltmarsh habitats.		✓
Conduct inventory to gather data regarding primary shorebird prey species, such as macro-invertebrate bi-valves, shrimp, crabs, and worms, in mudflats and saltmarsh habitats.		✓
Conduct inventory to gather data (presence/absence, habitat use, relative abundance) on wildlife species such as small mammals (e.g., rodents, bats), amphibians, reptiles, and pollinators.		✓
Conduct inventory to establish baseline data on Refuge tidal waters, sediments, and invertebrate biota regarding possible contamination from organochlorines, and heavy metals in particular, as well as polyaromatic hydrocarbons and conduct conventional tests such as fecal coliform, nutrients, and turbidity based on recommendations included in the Contaminants Assessment Process.		✓
Develop partnerships to survey eelgrass beds (both native and nonnative) within the Refuge boundary, establishing a baseline inventory and map of eelgrass species presence (see Objective 1.1, 1.2).		✓

**Rationale:**

An inventory is defined as a survey that estimates the presence, abundance, or distribution of species, habitats, ecological communities, or abiotic features at a particular time (701 FW 2). Inventories may also establish a beginning time-step (baseline) or reference information for subsequent monitoring. For example, a well-designed inventory may be repeated at a later time to assess the status and trends in the same location, which would then be considered monitoring. Appropriate and applicable inventories are necessary to determine resource status, promote learning, and evaluate progress toward achieving objectives whenever using adaptive management. Inventories would establish a benchmark for future comparisons and ensure that implementation of on-the-ground resource management activities achieve resource management objectives identified under Goals 1–3.

A Refuge I&M Plan needs to be developed to document the surveys required to determine species status, assess habitat condition, detect and identify changes in the Refuge’s diverse fish, wildlife and plant communities and physical resources including water, air and soils, and ecological processes. The Refuge I&M Plan would include information on the specific metrics required for supporting management decision-making and may include presence/absence, species composition, seasonal habitat use, spatial distribution, and/or population estimates. Specific inventories would establish baseline information on many aspects of different Refuge habitats and the fish, invertebrates, and most wildlife groups that use them. Information regarding contaminant levels of sediments, water, and invertebrates (shorebird and fish prey) would establish a baseline standard for comparison as harbor development increases or contaminant spills occur. Invasive species, both plant and animal, are threats, and some have already caused damage to habitats and affected wildlife, but the extent of some species, such as nonnative eelgrass, is unknown.

Funds are currently prioritized to perform the most pressing projects at the Refuge Complex, leaving few resources and staff available to do Grays Harbor Refuge-specific baseline inventories. Partnering with other field biologists from natural resource agencies, NGOs, private lands, and using qualified volunteers would be helpful in getting some of the needed inventories underway.

**Grays Harbor Refuge Objective 4.2: Monitoring**

Conduct high-priority monitoring activities that evaluate changes in the status of fish, wildlife, and their habitats. Information gathered facilitates adaptive management actions for resource management and visitor services. Monitoring projects can take place annually or periodically depending on the species, habitat, or management needs.

Monitoring of wildlife and habitat contributes to the enhancement, protection, use, preservation, and management of wildlife populations and their habitats on and off Refuge lands. Information gained can be used to evaluate achievement of resource management objectives identified under Goals 1–3.

These monitoring and survey activities would have the following attributes:

- Adhere to scientifically defensible protocols for data collection, where available and applicable
- Data collection techniques should have minimal animal mortality or disturbance and minimal habitat destruction
- Minimum number of samples (e.g., water, soils, vegetative litter, plants, macroinvertebrates, vertebrates) to meet statistical analysis requirements would be collected for identification and experimentation in order to minimize long-term or cumulative impacts
- Proper cleaning of investigator equipment and clothing and quarantine methods, where necessary, would minimize the potential spread or introduction of invasive species and disease

<b>Strategies Applied to Achieve Objective:</b>	<b>Alt 1</b>	<b>Alt 2</b>
Within 3 years of CCP completion, develop and implement an I&M Plan that provides the management rationale, timing, and costs for conducting Refuge surveys; lists the prioritized surveys; identifies the surveys selected for implementation; and documents the protocols that describe the survey objectives and methods.	✓	✓
Seek funding with partner contributions for priority surveys.		✓
Coordinate, plan, and periodically conduct a comprehensive shorebird survey of the entire Grays Harbor estuary in cooperation with partners.	✓	✓
Conduct annual ground surveys for shorebird species that use Refuge intertidal mudflats and marshes.	✓	✓
Conduct annual ground surveys for waterfowl and other migratory waterbird use of Refuge habitats.	✓	✓
Develop aerial spring shorebird survey methods for all of Grays Harbor estuary and seek funding to conduct annually.		✓

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<b>Strategies Applied to Achieve Objective:</b>	<b>Alt 1</b>	<b>Alt 2</b>
Assist in monitoring efforts related to threats to biological integrity from contamination in the Grays Harbor estuary.		✓
Monitor the health and abundance of sweetgrass on the Refuge through periodically measuring basic parameters and mapping, especially in relationship to the threats of climate change and sea level rise.		✓
Install sediment gauges in appropriate Refuge locations to gather preliminary information on sedimentation accretion rates to use with future research projects on climate change and sea level rise.		✓
Coordinate within the greater Grays Harbor estuary area to identify the latest monitoring and research efforts and to determine possible data gaps and research needs regarding sea level rise and climate change.		✓
Following the salt and brackish marsh berm removal, monitor the restored areas to determine the status of the changing plant community and fish and wildlife use.		✓
Annually work with Service Regional, Refuge, and migratory bird biologists and other agencies and partners to collect data of regional or flyway value such as the mid-winter aerial waterfowl survey.	✓	✓
Work with Service Regional, Refuge, and migratory bird biologists and other partners to establish a Pacific Coast Flyway protocol for shorebird migration surveys and assist in executing coordinated surveys to gain greater understanding of shorebird populations, status, and ecology.	✓	✓
Continue evaluating and improving control methods for nonnative plants, including <i>Spartina</i> , <i>Phragmites</i> , and other invaders as they are found.	✓	✓
Conduct surveys for invasive animals, such as Griffins isopod, green crab, invasive mussels, snails, and other marine invaders.		✓
Periodically conduct priority, invasive, nonnative plant surveys, map treatment control effectiveness, and assess treatment need.	✓	✓
Conduct baseline monitoring of water chemistry (especially acidity) and monitor changes over time.		✓
Hire a full-time wildlife biologist at the Refuge to ensure biological information is gathered and analyzed to support Refuge management, species recovery, and make management recommendations.		✓
Hire a biological technician to monitor invasive plants, control programs, and assist with high-priority monitoring programs.		✓

**Rationale:**

Monitoring consists of repeated survey efforts intended to document changes over time (e.g., months to years) and space in select attributes of wildlife, plants, habitats, ecological communities, or abiotic resources. Two types of monitoring in the Service policy (701 FW 2) are:

(1) Baseline monitoring. Monitoring that is not tied to specific predictions of how a natural resource will respond to management or environmental stressors, but instead is designed to document change over time of a natural resource. Examples include monitoring wildlife population trends, disease incidence, and climate change.

(2) Monitoring to inform management. Monitoring to assess whether a natural resource is approaching or exceeding a known threshold, or if a resource is responding to a management action or system stressor in a specified manner. This type of monitoring involves defining the threshold values or expected response, then surveying to measure the response or a closely related indicator. Comparing monitoring results with these expected values may show a need for initiating, intensifying, or altering management actions. Results from this type of monitoring are used in an adaptive management context to improve management or evaluate progress toward achieving management objectives, as derived from the Refuge System mission and Refuge purposes.

A new full-time biologist and a biological technician would make it possible to conduct needed surveys and monitoring of rare and sensitive species, as well as key avian, mammalian, or other wildlife species to provide information on their status. Species response to habitat enhancements would need to be understood to adapt management techniques and support sound management decisions.

The Refuge would partner with natural resource entities, specifically the North Pacific LCC, to address climate change and other biological stressors. As needed, objectives and strategies would be adjusted to assist in enhancing Refuge resources' resiliency to climate change and to potentially manage for new species assemblages in the future.

**Grays Harbor Refuge Objective 4.3: Research**

Conduct high-priority scientific research projects that provide the best science for habitat and wildlife management on and off refuges. These research projects may identify cause and effect relationships, produce new knowledge, and may last 1–3 years. Scientific findings gained through these projects would expand knowledge regarding life-history needs of species and species groups, as well as identify or refine habitat and wildlife management actions.

Research also would reduce uncertainty regarding wildlife and habitat responses to Refuge management actions in order to achieve desired outcomes reflected in resource management objectives and to facilitate adaptive management.

These research projects would 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 would likely have minimal animal mortality or disturbance and minimal habitat destruction

- Collect samples (e.g., water, soils, vegetative litter, plants, macroinvertebrates, vertebrates) to meet statistical analysis requirements for identification and experimentation in order to minimize long-term or cumulative impacts
- Utilize proper cleaning of investigator equipment and clothing and quarantine methods, where necessary, to minimize the potential spread or introduction of invasive species and disease
- Often result in peer-reviewed articles in scientific journals and publications and/or symposiums

<b>Strategies Applied to Achieve Objective:</b>	<b>Alt 1</b>	<b>Alt 2</b>
Seek funding, develop research partnerships, and initiate research to benefit the Refuge and the Service.		✓
Conduct research that supports Refuge informational and management needs and assists regional needs for greater understanding of applied resource management.	✓	✓
Work with university graduate school programs, Federal, State, and local agencies, Tribes, NGOs, and others to conduct research that would advance the science of habitat management on Refuge lands.	✓	✓
Develop a collaborative plan and initiate research to investigate the effects of sedimentation upon Refuge habitats over time, accretion rates and distribution, sediment sources, and hydrologic effects on sediment distribution within the Refuge, including comparisons to predicted sea level rise to assess shorebird foraging and roosting implications.		✓
Initiate research on avian shorebird predators, how avian shorebird predators utilize surrounding habitats and if predator activity affects how shorebirds use the Refuge.		✓
Initiate research into shorebird food resources including biofilm and macro/micro-invertebrate population abundance to better understand food availability during spring migration and shorebird needs.		✓
Work with the Service’s I&M program on Refuge legacy data (e.g., shorebird counts) to determine long-term population trends, use of Refuge habitat, and reliability of the data.		✓
Continue to support red knot ecological research on the Refuge and in the greater estuary.	✓	✓
Support red knot conservation with research on population trends and habitat needs and develop management measures as appropriate.		✓
Participate in regional Pacific Flyway research studies on shorebird ecology, population trends, and habitat needs, especially those that support Refuge management needs.		✓

<b>Strategies Applied to Achieve Objective:</b>	<b>Alt 1</b>	<b>Alt 2</b>
Coordinate with other natural resource agencies and partners to better understand the ramifications of nonnative and invasive Japanese eelgrass in open water, mudflats, and saltmarsh habitats and how it affects native habitat for shorebirds, invertebrates, fish, and other wildlife.		✓
Seek funding for, develop, and assess shorebird habitat use in the Grays Harbor estuary to identify areas that may provide alternative habitat in the face of future sea level rise (see Objective 3.1).		✓

**Rationale:**

Research projects on Refuge lands would address a wide range of natural and cultural resource and public-use management issues. Examples of research projects include habitat use and life-history requirements for specific species and 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 and wildlife response, identification and analyses of paleontological specimens, wilderness character, modeling of wildlife populations, and assessing response of habitat and wildlife to disturbance from public uses. Projects may be species-specific, refuge-specific, or evaluate the relative contribution of the Refuge to larger landscape (ecoregion, region, flyway, national, international) issues and trends. Like monitoring, results of research projects would 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 would promote adaptive management on Refuge lands. Scientific publications resulting from research on Refuge lands would help increase the visibility of the Refuge System as a leader in the development of the best science for conserving and managing resources.

Specific research needs on the Refuge include understanding the tidal movement, sediment deposition, and the rate of accretion and the effects on the mudflat habitat that is so critical to shorebird foraging during spring migration. Research into the relationship of avian predator activity and their impacts on shorebird site use would provide important information that would help managers determine how to manage certain habitat types. Shorebird foraging information, especially regarding prey and biofilm abundance and use, would be vital for managers to understand how adaptive management can be used. Some shorebirds are in decline and more information is needed to understand shifting habitat needs and use and foraging preferences. The Refuge would work with partners to identify higher elevation potential transition habitats that would be able to support shorebirds as water levels rise and habitats change over time.

The Refuge supports external research projects that explore factors affecting focal wildlife species and their habitats, with the intent to increase our understanding and ability to manage these resources, as well as to support regional needs for greater understanding of applied resource management.

The Refuge would join the North Pacific LCC, which is a series of formal science-management partnerships between the Service, Federal agencies, States, Tribes, 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 would be adjusted to assist in

enhancing the Refuge's resources' resiliency to climate change and to potentially manage for new species assemblages in the future.

***Goal 5. Provide quality opportunities for visitors to observe and photograph a diversity of wildlife and habitats to enhance visitors’ understanding and appreciation of the Refuge’s natural resources and to foster a connection with nature.***

**Grays Harbor Refuge Objective 5.1: Welcome and Orientation**

Provide visitors with welcoming and orienting features, facilities, and experiences. These would be characterized by:

- Directional signage on roadways
- Refuge entrance sign
- Information kiosk
- Orientation signs
- Signed parking
- Trailhead and trail signs
- Use of electronic and print media to reach and orient visitors

<b>Strategies Applied to Achieve Objective:</b>	<b>Alt 1</b>	<b>Alt 2</b>
Work with WSDOT to maintain directional signs on State Highway 109.	✓	✓
Work with WDFW to maintain Watchable Wildlife signs.	✓	✓
Maintain Refuge entrance sign on State Highway 109 and Paulson Road.	✓	✓
Maintain information kiosk at Port of Grays Harbor gate.	✓	✓
Improve parking area surface and install appropriate signs.		✓
Provide electronic and print media with accurate information that is positively worded and available at the Refuge kiosk and other local venues such as the Chamber of Commerce.		✓
When possible, provide information in English and Spanish.		✓
When and where appropriate, provide visitor amenities such as toilets and garbage cans, i.e., during special events and if the new nature center is built.		✓
Enhance the hardscape around the kiosk and Port of Grays Harbor gate to make the pedestrian passage more visible and accessible, in coordination with Port of Grays Harbor.		✓
Establish administrative assistant position to support Refuge operations, habitat management and restoration, visitor services program, and facilities management.		✓

**Rationale:**

Customer service and first impressions are important for visitors to feel welcome and safe at national wildlife refuges. Local visitors to Grays Harbor Refuge do not necessarily know they are on a national wildlife refuge, and those that come from outside the area need welcome and orientation features that are easily found and well maintained. Visitors need accurate, timely, and appropriate orientation materials and information on Refuge facilities, programs, and experiences. These strategies would increase Refuge visibility and promote visitor compliance with Refuge regulations.

Staffing priorities would include an administrative assistant position to assist with Refuge management activities, facilities operation, expanded habitat management projects, and expanded visitor services programs.

**Grays Harbor Refuge Objective 5.2: Provide high-quality wildlife observation and nature photography opportunities**

Provide compatible wildlife observation and photography opportunities with the following characteristics:

- Safe and accessible facilities that are available to a broad spectrum of the public
- Opportunities to view and photograph a diversity of wildlife in their habitats and in a natural setting
- Access provided to a diversity of habitats
- Viewing opportunities tied to interpretive and educational opportunities
- Observation opportunities promote public understanding of Grays Harbor Refuge resources and the Refuge’s role in managing and protecting those resources
- Observations occur in places with the least amount of disturbance to wildlife
- Observers have minimal conflict with other visitors or operation of the Refuge

Strategies Applied to Achieve Objective:	Alt 1	Alt 2
Collaborate with Port of Grays Harbor to maintain access to the Sandpiper Trail (pedestrian and maintenance vehicles).	✓	✓
Maintain Sandpiper Trail and, where appropriate, keep vegetation low to allow shorebird viewing.	✓	✓
Continue to work with partners to provide wildlife observation and photography opportunities during the spring shorebird migration.	✓	✓
Enhance viewing opportunities along the Port of Grays Harbor road. Select at least one site and install a small viewing platform on Refuge lands in coordination with the Port of Grays Harbor and FAA.		✓
Explore extension of the Sandpiper Trail spur at the northwest end by up to 250 feet for improved shorebird viewing in coordination with the Port of Grays Harbor and FAA.		✓
Increase viewing opportunities at the parking area. Build a viewing deck/platform associated with the information kiosk.		✓

<b>Strategies Applied to Achieve Objective:</b>	<b>Alt 1</b>	<b>Alt 2</b>
Rehabilitate existing Refuge building for use as a maintenance shop to support habitat management and trail and visitor facility maintenance programs.		✓
Work with partners to consider feasibility of constructing a bike and walking trail along Paulson Road.		✓
Hire a permanent maintenance worker to maintain trails, visitor facilities, and assist with habitat management.		✓
Hire a permanent visitor services manager to operate the nature center, if constructed, and plan and conduct the visitor services program for a broad range of visitors.		✓
Hire a refuge officer to protect Refuge resources and for visitors, employees, and facilities.		✓

**Rationale:**

Observation and photography of wildlife and nature promote public understanding and appreciation for the Refuge’s natural resources. Wildlife observation is the primary visitor activity at Grays Harbor Refuge. Wildlife observation and photography programs are designed to provide a diversity of high-quality viewing opportunities for visitors while minimizing disturbance to wildlife and habitats.

Grays Harbor Refuge offers excellent bird watching and wildlife observation opportunities for a wide variety of shorebird and waterbird species. Native habitats are easily viewed from the Sandpiper Trail, which is open year round. The Refuge is open to the public from sunrise to sunset; however, some areas are closed to protect wildlife and habitat from disturbance. Volunteers walk the trail and provide interpretive and other information to visitors to increase their understanding of natural resources. High-quality wildlife viewing would continue to be provided on the Refuge through the maintenance and development of trails and observation sites.

**Grays Harbor Refuge Objective 5.3: Provide high-quality interpretive opportunities**

Provide a variety of high-quality interpretive opportunities to Refuge visitors. Interpretive developments shall include information about the importance of the Refuge to native habitats and their associated plants, fish, and wildlife species throughout the year.

High-quality interpretive programs should consist of the following attributes:

- State-of-the-art technology incorporated into interpretive materials, where appropriate
- Target all users regardless of demographics
- Facilitate self-discovery of information using all five senses
- Incorporate the importance of the Refuge System and the purpose, goals, and objectives of the Refuge
- Use a variety of interpretive materials, including signage, exhibits, brochures, and a website.
- Explore interconnections of natural and human world

- Emphasize nonguided activities but also include periodic guided programs
- Link to wildlife observation and environmental education programs

<b>Strategies Applied to Achieve Objective:</b>	<b>Alt 1</b>	<b>Alt 2</b>
Maintain all existing interpretive features on the Sandpiper Trail.	✓	✓
Update the Wildlife List and produce in the Service’s standard format.		✓
Update plant list and make available to the public upon request.		✓
Continue to improve the Refuge’s website to include expanded information on the native habitats and their associated plants, fish, and wildlife species, and visitor opportunities throughout the year, and link with other appropriate sites.	✓	✓
Develop a series of interpretive panels for placement on the Sandpiper Trail and at the Refuge kiosk.		✓
Develop a panel that includes a map and Refuge regulations for placement on the Refuge kiosk.		✓
Develop an interpretive panel on the Refuge System for placement on the Refuge kiosk.		✓
Work with partners to provide guided walks and interpretive programs for the general public.		✓
Continue to provide guided walks during the spring shorebird migration, including during the Grays Harbor Shorebird and Nature Festival.	✓	✓
Maintain the general Refuge brochure and have available at the Refuge kiosk, the local Chamber of Commerce, and other local venues as appropriate.	✓	✓
Continue to work with partners on the Grays Harbor Shorebird and Nature Festival and provide high-quality interpretive experiences along the Sandpiper Trail with the help of volunteers.	✓	✓
Look for unique ways to provide information about the Refuge such as a radio spot that drivers can tune into along State Highway 109, narrated podcast for smartphones or computers, and Quick Response (QR) codes on interpretive materials.		✓
Incorporate current issues, such as invasive species and climate change, into new interpretive materials.		✓

**Rationale:**

As one of the Service's priority public uses, environmental interpretation is an important management activity for the Refuge. Interpretation is a communication process that forges emotional and intellectual connections by providing opportunities for visitors to make their own connection to the resources. It is at the heart of connecting people of all ages in a variety of ways to our natural world. Messages and stories are delivered through both formal (e.g., programs and walks) and informal methods (e.g., materials, panels, and exhibits). Both methods have the objective of facilitating self-discovery, examining systems, and exploring how the natural world and human activities are interconnected. Participants of all ages would engage in stimulating and enjoyable activities as they learn about the Refuge and issues confronting fish and wildlife resource management and protection. We would emphasize first-hand experiences with the environment through presentations, audio-visual media, and exhibits as necessary components of the Refuge interpretive program.

***Goal 6. Provide environmental education opportunities that initiate a sense of wonder and foster a connection with nature and the Refuge for students both on and off the Refuge.***

**Grays Harbor Refuge Objective 6.1: Environmental Education (onsite)**

Provide and support field trips to the Refuge, particularly during the spring shorebird migration, for 3<sup>rd</sup> and 4<sup>th</sup> grade students in Grays Harbor County. The onsite program would include:

- Extending and enhancing classroom learning and providing students with a first-hand experience with shorebirds, other wildlife, and native habitats
- A minimum of 50 percent of field trips associated with in-classroom presentations.
- Reaching a minimum of 500 grade school students annually
- Supporting the Service’s “Connecting People with Nature” emphasis
- Using a diversity of education methods and tools

<b>Strategies Applied to Achieve Objective:</b>	<b>Alt 1</b>	<b>Alt 2</b>
Provide an education coordinator through the AmeriCorps program or other avenues that become available.	✓	✓
Hire a permanent education specialist to manage the day-to-day programming for the education program and coordinate with education partners throughout Grays Harbor County.		✓
Maintain trails that enable students to view wildlife.	✓	✓
Develop additional facilities that would enhance learning while at the Refuge, including interpretive panels, viewing areas, and trails.		✓
Work with partners and the Refuge volunteer program to continue to support school field trips to the Refuge.	✓	✓
Continue coordination with the Port of Grays Harbor to allow access to the Sandpiper Trail trailhead.	✓	✓

**Rationale:**

Environmental education is a high-priority, wildlife-dependent public use of the Refuge and an important focus of the visitor services program. The program reaches local students that may not otherwise have opportunities to visit and learn about their local natural areas and the wildlife found there.

The Refuge is in a special position to offer local schools, teachers, and students an opportunity to learn about shorebirds, waterbirds, rare or endangered species, and engage in conservation issues in an outdoor setting. Field trip options would allow classes to experience what they have learned in the classroom firsthand. Volunteers and partners would assist in providing support for groups visiting the Refuge.

To meet student needs, Refuge staff is committed to working with schools and teachers to provide opportunities for students to experience fish, wildlife, and habitats at the Refuge and learn about

Refuge resources, habitat conservation, and cultural resources. A full time education specialist would allow the program to grow and reach more students with quality education programs.

**Grays Harbor Refuge Objective 6.2: Environmental Education (off-site)**

Provide and support offsite environmental education opportunities through classroom lessons and activities for 3<sup>rd</sup> and 4<sup>th</sup> grade students in Grays Harbor County.

The offsite program would include:

- Working with teachers willing to commit to both classroom lessons and a Refuge field trip
- Providing a series of six lessons per class from November through June that emphasize shorebirds, shorebird conservation, ecology, and the natural history of the area
- Providing materials and ideas for extending lessons throughout the year
- Providing home extension activities
- Emphasizing hands-on, multi-disciplinary learning

Strategies Applied to Achieve Objective:	Alt 1	Alt 2
When funding is available, provide an education coordinator through the AmeriCorps program or other similar venues.	✓	✓
Make yearly contact with 3 <sup>rd</sup> and 4 <sup>th</sup> grade teachers in Grays Harbor County to provide information about the Refuge’s environmental education program and invite participation.	✓	✓
Utilize the materials and resources provided through the Shorebird Sister School Program.	✓	✓
Conduct the annual Shorebird and Nature Festival Poster Contest in coordination with partners and assist teachers with student entries.	✓	✓
Maintain up-to-date and accurate information for teachers on the website.	✓	✓
Evaluate and keep current materials and activities that are offered to teachers and students to ensure topics of importance to the local area, like climate change, are addressed.	✓	✓
Work with partners to continue to find more long-term ways to financially support the education coordinator position and program.	✓	✓
Work with partners to develop educational outreach tools utilizing new technologies (e.g., web cam, YouTube, Flickr) for virtual Refuge educational experiences.		✓

**Rationale:**

Environmental education is one of six wildlife-dependent public uses that are outlined in the 1997 Refuge Improvement Act. Environmental education is a high-priority, wildlife-dependent public use of the Refuge. Off-site environmental education can encourage participation from more students than

could otherwise be reached and helps to strengthen partnerships with schools, educational organizations, and local community members.

The Refuge is in a unique position to offer local education agencies, teachers, and students an opportunity to learn about shorebirds, shorebird conservation, and rare or endangered species and engage in natural resource management and conservation issues in their local community. To meet student needs, Refuge staff is committed to working with schools and teachers to provide in-classroom presentations and help with the environmental curriculum. Support could also include field trips, participation in off-site activities like poster contests or festivals, and strengthening of long term partnerships with local schools and the community.

**Grays Harbor Refuge Objective 6.3: Environmental Education Teacher and Volunteer Training**

Provide training and support for teachers, Refuge volunteers, and interns who would assist in conducting the environmental education programs for the Refuge.

Attributes of the education training program would include:

- Providing one-on-one or group assistance to educators who would use the training and information each year with students
- Partnering with other groups to provide training to educators on a variety of natural history and conservation topics for a variety of age groups, e.g., early childhood educators
- Conducting periodic volunteer training sessions to prepare volunteers to provide high-quality and accurate educational methods, techniques, and tools that are appropriate for teaching students and introduce new volunteers to the education program
- Requesting feedback from teachers and partners to improve the program

<b>Strategies Applied to Achieve Objective:</b>	<b>Alt 1</b>	<b>Alt 2</b>
Maintain an up-to-date “Educator’s Guide to Grays Harbor NWR” and make available for educators.	✓	✓
Notify educators at the beginning of the school year that training is available.	✓	✓
Recruit and train Refuge volunteers who would work with the education program.	✓	✓
Look for ways to partner with other organizations to provide teacher training.	✓	✓
Ensure that teachers involved in the program receive one-on-one or group training about the Refuge, classroom activities, and Refuge field trips.	✓	✓

**Rationale:**

Training is an important component of environmental education. By training teachers about environmental issues important to the Refuge, they could use the information and resources each year with their students. Teachers look for ways to become more knowledgeable, enhance their skills, and

acquire new resources; teacher training provides them with new knowledge and opens up different avenues for teaching. Teachers participating in Refuge trainings are more likely to use resources offered and are more likely to take students outside, including to the Refuge. Training of Refuge volunteers and interns to assist with the education program would enable the Refuge to maintain the level of quality programming provided to students.

***Goal 7. Support and strengthen an active volunteer work force and Friends Groups to assist in providing quality visitor services programs and outreach.***

**Grays Harbor Refuge Objective 7.1: Strengthen and promote a Refuge volunteer program**

Improve volunteer opportunities associated with the Refuge with the following attributes:

- Provide effective training and program management
- Support and complement the Service mission and current initiatives
- Increase visibility and foster conservation
- Support a variety of Refuge programs and activities and increase their effectiveness
- Encourage community involvement and strengthen relationships

Strategies Applied to Achieve Objective:	Alt 1	Alt 2
Publicize volunteer opportunities to attract new volunteers representing a broad spectrum of the community.	✓	✓
Look for ways to partner with other organizations to provide volunteers.	✓	✓
Maintain and provide to volunteers an up-to-date “Volunteer Training Manual” for Grays Harbor Refuge.	✓	✓
Provide a training course for volunteers on the Service; Refuge history, management, and natural resources; the specifics of the Refuge volunteer program and volunteer opportunities; and about the specifics of the volunteer duties.	✓	✓
Recruit and train volunteers who would work with the education and outreach programs.	✓	✓
Recruit and train volunteers to work as trail rovers and weed warriors.	✓	✓
Recruit and train volunteers from the Refuge Complex to help with a variety of Refuge activities.		✓
Provide volunteers with an annual recognition.		✓

**Rationale:**

Volunteers provide an important and needed service on national wildlife refuges. Successful volunteer programs are recognized as a key component of the successful management of public lands and vital to implementation of Refuge programs, plans, and projects, especially in times of declining budgets.

The Refuge volunteer program began in 2001 and since then a small group of volunteers has worked performing a variety of jobs, including assisting with the environmental education and interpretation programs, special events, trail roving, wildlife surveys, invasive plant control, administration, and maintenance. Recruitment and training of new volunteers has occurred almost annually. A volunteer

training manual is kept up-to-date and provided to volunteers. Partners such as Grays Harbor Audubon Society have provided the bulk of volunteer services over the years and would probably continue to do so in the future. Recruiting volunteers has been challenging and attrition is high. Managing an effective volunteer program at the Refuge has proven to be difficult because the Refuge is not staffed, has no facilities, and is an hour's drive from the Refuge Complex Headquarters where the volunteer manager is stationed.

The role volunteers have played over the years has been very important and the Refuge would continue to have a need for volunteers into the future. In addition to providing assistance with programs and helping the Refuge meet its mission, volunteers are outreach ambassadors in the community. They spread the word about the Refuge throughout the local community where they live.

**Grays Harbor Refuge Objective 7.2: Support and encourage partnerships to support Visitor Services programs**

Support and encourage partnerships with the following attributes:

- Partners would support the mission of the Refuge
- Working together with Refuge staff, partners would be advocates for the Refuge in helping secure resources and funding for programs and facilities
- Partners would provide needed volunteer support to Refuge programs

Partners may be a part of a network of Friends Groups across the county supporting and advocating for the National Wildlife Refuge System

<b>Strategies Applied to Achieve Objective:</b>	<b>Alt 1</b>	<b>Alt 2</b>
Identify local community groups, businesses, and organizations that could help support the Refuge's visitor services program and facilities development.	✓	✓
Work with local partners to produce the Grays Harbor Shorebird and Nature Festival.	✓	✓
Explore ways to work with the Chehalis Basin Partnership to provide education and outreach to local communities.		✓
Explore ways to partner with Grays Harbor College.		✓
Continue to work with Refuge Friends groups including Grays Harbor Audubon Society and Friends of Nisqually NWR in support of education, outreach, and habitat programs.	✓	✓

**Rationale:**

National wildlife refuges have developed extensive and sophisticated partnerships and Friends Groups in order to carry out the mission of the Refuge System. Partners provide support in a variety of ways at the local, regional, and national levels. Partnerships and Friends Groups provide a way for citizens to be involved in and work to enhance and improve the resources Refuges are mandated to

protect. Without a constituency of local support, Refuges today would not be able to accomplish their mission.

The visitor services program at the Refuge has relied on, and would continue to rely on, partnerships to support the various components of the program. Production of the yearly Grays Harbor Shorebird and Nature Festival requires the collaboration of numerous local partners, including Grays Harbor Audubon Society, the City of Hoquiam, the Port of Grays Harbor, WDFW, and numerous others. Financial support by partners for the education program has enabled the Refuge to have an AmeriCorps volunteer and has supported bus transportation for Refuge field trips. These invaluable contributions by partners would continue to play an important role in the success and growth of the Refuge’s visitor services programs.

New partners need to be identified and engaged in order to ensure the development of new facilities can be accomplished. Support at the local level would continue to be extremely important for the building of a nature center and associated trails (See Section 2.3.2 Features Common to All Alternatives at Grays Harbor National Wildlife Refuge for information on the nature center).

Working with a variety of partners, such as the Chehalis Basin Partnership and Grays Harbor College would enable the Refuge to reach new audiences and to stay active and visible in the local community.

**Grays Harbor Refuge Objective 7.3: Enhance outreach targeting local communities to promote appreciation of and generate support for the Refuge**

Develop, maintain, and provide outreach programs in communities throughout Grays Harbor County that focus on fish, wildlife, and their habitats, with an emphasis on shorebirds and shorebird conservation.

Outreach program attributes would:

- Provide accurate information about natural resources, management, and conservation of those natural resources
- Actively include partners and volunteers in development and implementation of programs and events
- Reach a broad spectrum of audiences regardless of demographics
- When possible, provide materials in Spanish
- Use a variety of media

<b>Strategies Applied to Achieve Objective:</b>	<b>Alt 1</b>	<b>Alt 2</b>
Continue to support and be an active participant in the yearly annual Grays Harbor Shorebird and Nature Festival.	✓	✓
Identify ways to reach out to nontraditional audiences, e.g., the Latino population in Grays Harbor County.		✓
Develop outreach materials in Spanish.		✓
Work with partners and volunteers to identify opportunities for Refuge involvement in outreach programs and events.		✓

**Rationale:**

Local support for national wildlife refuges is critical to achieve the mission of the Refuge. Conservation and enhancement of habitats and wildlife is extremely difficult without local support. Many people in Grays Harbor County do not know about the Refuge. The challenge is to find ways to inform people and get them interested in supporting Refuge programs.

Since 1994, the Grays Harbor Shorebird and Nature Festival has been the main outreach event for the Refuge. Working in partnership with Grays Harbor Audubon Society, the City of Hoquiam, the Port of Grays Harbor, and many other sponsors, the Refuge helps develop and execute an event celebrating the spring migration of shorebirds in Grays Harbor County. The Festival has an attendance average of 1,400 people. The Shorebird and Nature Festival Poster Contest, free guided walks at the Refuge, and free lectures have all been established to try and attract local participation; however, more needs to be done.

The opportunity to participate in other local events exists; time and volunteer and staff availability is a challenge in attending these events. In past years, the Refuge has had a booth at the Grays Harbor County Fair, Hoquiam River Days, and Volunteer Day at the Mall.

Reaching a more diverse audience would be beneficial. Grays Harbor County has a large Latino population and many of them are first-generation and may or may not speak English. Some children of these families are being reached through the education program; finding ways to reach the families would be a logical next step. Outreach to the Latino community via churches, events, and clubs could be a great way to start making contacts. Providing materials in Spanish would also be essential.

Outreach to local businesses would also benefit the Refuge and help achieve the goals set out in this plan. Advocacy and financial support for new programs and facilities would be necessary for progress to be made. Finding common ground with the business community through personal contacts, events, partnerships, and volunteer help would be essential.

## 2.4.2 Black River Unit of Billy Frank Jr. Nisqually National Wildlife Refuge

***Goal 1. Protect, maintain, and enhance aquatic habitats characteristic of the upper Black River Watershed while maintaining historical characteristics of the north Puget Trough Lowlands for the benefit of native fish, amphibians, migratory birds, and a diverse assemblage of other native species.***

### **Black River Unit Objective 1.1: Protect, maintain, and enhance the Black River channel habitat**

Alongside WDNR, protect, maintain, and enhance up to 7.5 miles of channel habitat for native fish and wildlife, including rare and declining species such as the Oregon spotted frog and Olympic mudminnow.

Desired characteristics of this channel habitat include:

- Channel depths range from 2–15 feet deep in the main channel
- Plentiful water supply throughout the seasons to maintain channel habitat and sustain fish and wildlife populations\*\*
- Annual high water events spread water out over the floodplain in winter and spring
- Abundant native submersed and emergent vegetation such as American waterweed, pondweed species, smartweed, narrow leaf bur-reed, and water starwort\*\*
- 5–20 percent of channel edge is exposed mud without vegetation
- Muddy, silty, and sometimes unconsolidated river bottom
- Water temperatures are seasonally <64°F
- Presence of decaying, large woody debris that may support herbaceous vegetation such as small flowered forget-me-not, smartweed, monkey flower, and water starwort
- Low to minimal populations of nonnative bullfrogs and warm-water fish populations that threaten natural food web processes\*\*
- < 15 percent cover of nonnative, invasive plants that threaten the native plant community
- Reduce reed canarygrass\*\*

**Channel habitat** is defined by the location of water flows within the confines of river or tributary banks and includes the nearby edges of the sloped bank. The current length/measurement of channel habitat includes lands and waters that are under the jurisdiction of WDNR.

*\*\*Attributes identified in current and/or proposed inventory, monitoring, and research activities*

Strategies Applied to Achieve Objective:	Alt 1	Alt 2
Work with WDNR to develop an interagency agreement or similar instrument that promotes cooperative management of the river channel between WDNR and the Service within the approved Unit boundary. See also Section 2.3.3, Features Common to All Alternatives at the Black River Unit of Billy Frank Jr. Nisqually National Wildlife Refuge.	✓	✓
Within 8 years of completion of the CCP, complete a detailed Water Resources Inventory and Assessment (WRIA).		✓
Coordinate and partner with appropriate agencies to sustain and enhance hydrological conditions needed to support channel habitat and ensure an		✓

<b>Strategies Applied to Achieve Objective:</b>	<b>Alt 1</b>	<b>Alt 2</b>
appropriate water budget and delivery, including water quantity and quality.		
Monitor and use appropriate IPM techniques, such as mechanical, physical, biological, and chemical methods (see Appendix G), to control invasive or undesirable plant or animal species.	✓	✓
Annually control nonnative, invasive, or undesirable plants such as yellow flag iris in the river channel habitat.		¼ mile treated/ year
Annually control all purple loosestrife along the edge of the river channel (see Appendix G).	south of pipeline	north and south of pipeline
Coordinate with other agencies to determine best control methods for reed canarygrass to use in river channel and implement control.		✓
Establish permanent refuge operations specialist position to coordinate and conduct Unit operations, habitat management, and visitor services programs.		✓

**Rationale:**

The Black River is a unique lowland river and considered by some to be the most complete intact river system of its type remaining in western Washington. The Black River is an important tributary of the Chehalis River watershed, the second largest watershed in Washington State. Located within the approved Unit boundary, there are approximately 7.5 miles of free flowing river channel habitat that serves as a vital migration pathway, provides some spawning grounds, and good quality rearing habitat for juvenile salmonids, resident fish, and amphibians. However, multiple stressors (both on and off the Unit) have compromised the natural function and hydrology of the northern section of the river influencing water temperature, water movement, water quality, sediment transport, habitat complexity, and animal passage.

A WRIA is necessary to study these stressors and to assist Unit staff by identifying various management options to improve habitat conditions, water quality, and hydrologic regimes in the river system.

Unit staff would implement an inventory and monitoring program to understand and manage impacts from invasive species on the resources. Invasive plants within the river channel and along the edges, such as reed canarygrass, are present, and some nonnative, submerged plant species are suspected. Reed canarygrass has severely altered the habitat in some places by impeding water flow and developing monotypic plant stands, thereby affecting habitat quality and wildlife use. The Unit would work with other agencies to determine the best methods to control reed canarygrass and other species in the river channel. (See Obj. 3.1 and Goal 4.) Staff would increase control measures annually on yellow flag iris by treating or removing the plant on an additional quarter-mile of river channel habitat each year. In addition, purple loosestrife would be found and treated along the river channel, including the northernmost locations for the benefit of a variety of native wildlife, including

rare species such as Olympic mudminnow and Oregon spotted frog, and to enhance native plant communities.

Control and treatment for bullfrogs is needed because bullfrogs outcompete, predate upon, and displace Oregon spotted frogs (see also Section 4.6). Auditory bullfrog presence/absence surveys would take place in June. Control techniques would be used during day or night as needed using hand capture, gigging, and netting as appropriate. Captured bullfrogs would be anesthetized with 20% benzocaine gel on its ventral abdomen and then frozen until dead.

The Refuge Complex would seek to establish a permanent refuge operations specialist position to ensure enhanced coordination with our partners and implementation of all habitat management projects, completion of inventory, monitoring, and research programs and projects, invasive species removal, and management of the new visitor services programs.

**Black River Unit Objective 1.2: Protect, maintain, and enhance Black River tributary channel habitat**

Protect, maintain, and enhance up to 16 miles of Black River tributary channel habitat for native fish, amphibians, invertebrates, and wildlife.

Desired characteristics of tributary channel habitats include:

- Clear, running shallow streams or deeper water streams
- Cool water temperatures in riparian associated tributaries < 60°F
- Equal or higher dissolved oxygen level than in the Black River
- Firm channel bed with graduated-size cobble or soft, peat substrate
- Presence of natural woody debris
- Barrier-free passage for native fish and tadpoles
- Low to minimal populations of nonnative bullfrogs and warm-water fish populations\*\*
- < 15 percent cover of nonnative, invasive plants that threaten the native plant community
- Reduce reed canarygrass (see Rationale in Objective 1.1)\*\*

**Tributary channel habitat** is defined by the location of water flows within the confines of tributary banks and includes the nearby edges of the sloped bank. The length/measurement includes tributaries currently under ownership (fee title) of Billy Frank Jr. Nisqually National Wildlife Refuge.

*\*\*Attributes identified in current and/or proposed inventory, monitoring, and research activities*

Strategies Applied to Achieve Objective:	Alt 1	Alt 2
Monitor and use appropriate IPM techniques, such as mechanical, physical, biological, and chemical methods (see Appendix G), to control invasive or undesirable plant or animal species.	✓	✓
Annually control invasive plants on a minimum of 20 percent of tributary channel habitat.		✓

<b>Strategies Applied to Achieve Objective:</b>	<b>Alt 1</b>	<b>Alt 2</b>
Within 3 years of acquisition of new parcels, identify and remove or replace fish barriers including any culverts or other artificial structures that would deter fish passage.	✓	✓
Use standard enhancement techniques (riparian plantings, IPM techniques, placement of large woody debris, etc.) as appropriate to improve tributary channel conditions.		✓
Coordinate and partner with agencies and other partners to sustain and enhance the hydrological conditions needed to maintain a healthy habitat.		✓
Coordinate with other agencies to determine best control methods for reed canarygrass to use in tributary channel and implement control.		✓

**Rationale:**

Tributaries within the Unit boundary where Unit ownership occurs include Waddell, Dempsey, and several smaller unnamed creeks. Prior to entering the Unit boundary, these creeks meander through agricultural and residential areas presenting a variety of issues and conservation challenges for maintaining a healthy watershed. Unit staff would seek to expand and build relationships to work with various agencies and landowners in an effort to improve the quality of this habitat influenced by off-Unit activities. The Unit would complete a WRIA prior to identifying priority enhancement opportunities that are essential for improving the health of the Black River Watershed (Objectives 1.1 and 4.3). Implementing habitat management techniques such as riparian plantings, IPM techniques, and placement of large woody debris, as appropriate would benefit the watershed and fish and wildlife.

Unit staff would increase invasive species control measures to treat 20 percent of tributary habitat annually on species such as yellow flag iris and purple loosestrife to benefit stream function and a variety of native wildlife, including some endemic and rare species such as Olympic mudminnow and Oregon spotted frog. Research and monitoring are vital to assess overall water flow, channel function, water quality, quantity, and wildlife and fish usage. (See Obj. 4.2 and 4.3.) Reed canarygrass is present within tributary channels and along the immediate edges. Reed canarygrass has severely altered the habitat in some places by impeding water flow and developing monotypic plant stands, thereby affecting its wildlife inhabitants. The Unit would work with other agencies to determine best methods to control reed canarygrass and other species in tributary channel habitat. (See Objective 3.1 and Goal 4.) See Objective 1.1 and Section 4.6 for the rationale for bullfrog control and treatment.

Maintaining and improving the quality of the tributary channel habitat supports the ecological health of the Black River Watershed and the greater Chehalis Watershed, supporting numerous species of aquatic plants, fish, amphibians, mammals, and birds.

**Black River Unit Objective 1.3: Protect, maintain, and enhance bog habitat**

Protect, maintain, and enhance a minimum of 56 acres of unique and rare bog habitat that includes characteristic plant species and associated wildlife.

Desired characteristics of bog habitat include:

- Peat soils dominated by sphagnum or have sphagnum species growing on the soil surface
- Soils are generally saturated year round, in some cases are seasonally flooded, yet are isolated from surface water flow
- Low pH and low nutrient availability
- Fed primarily by precipitation and are generally restricted to areas in which precipitation exceeds evapotranspiration
- Bog species may include sphagnum moss, Labrador tea, native cranberry, sundew, white beak-rush, cottongrass, western bog laurel, and lodgepole/shore pine, and Beller’s ground beetle, Hatch’s click beetle, or Queen Charlotte’s copper butterfly\*\*
- ≤ 5 percent cover of nonnative, invasive plants that threaten the native plant community\*\*

*\*\*Attributes identified in current and/or proposed inventory, monitoring, and research activities*

<b>Strategies Applied to Achieve Objective:</b>	<b>Alt 1</b>	<b>Alt 2</b>
Within 5 years, partner with bog specialists to identify locations and map bog types.		✓
Within 5 years, conduct survey to inventory plant and animal species composition, distribution, and relative abundance within the bog habitat.		✓
Within 8 years of completion of the CCP, complete a detailed WRIA by the Service.		✓
Coordinate and partner with appropriate agencies to evaluate hydrological conditions necessary to support this habitat.		✓
Upon completion of inventories, surveys, and the WRIA, develop a good understanding of hydrologic processes, abiotic and biotic processes and threats, and how to manage them to sustain this sensitive and rare habitat.		✓
Initiate appropriate habitat enhancement if a rare or declining species or habitat is found.		✓
If valid, develop an RNA proposal package, including habitat description, map, and rationale for Regional/National approval.		✓
Participate and partner with National Natural Areas Network information sessions by sharing research information.		✓
Evaluate potential for translocation of rare species as appropriate, including marsh sandwort and water howellia, implement recovery actions if warranted.		✓
Annually control invasive plants on a minimum of 30 percent of known bog habitat.		✓

<b>Strategies Applied to Achieve Objective:</b>	<b>Alt 1</b>	<b>Alt 2</b>
Work with partners and researchers to develop protocols for inventory, monitoring, and research within the bog habitats (see Goal 4).		✓
Monitor and use appropriate IPM techniques, such as mechanical, physical, biological, and chemical methods (see Appendix G), to control invasive or undesirable plant or animal species.		✓

**Rationale:**

Bog habitats are unique in Washington State and are increasingly rare in the Puget Trough ecoregion. Only a fraction of western Washington’s original bogs remain undisturbed. Knowledge regarding the extent and type of bog habitat found within the Unit boundary is extremely limited. A partial assessment of Unit lands has identified over five types/classifications of bog habitats which may include Federal and State-listed species and species of concern. There are a variety of unique plant species which have been specially adapted to live in bogs; some found on the Unit include western Labrador tea, sphagnum moss species, sundew, bog cranberry, bog laurel, bog orchid, and bog birch. Other species are found in bogs and other habitats including shore pine, thin-leaf or gray alder, and cottongrass. A number of Federal and State-listed insect species specifically adapted to bogs may also inhabit the Unit. Directed inventories of the plant and animal species within the bog habitat are necessary to assess habitat quality and the potential for establishing an RNA to advance scientific research, education, and protection. Additional inventories and research would also identify rare plant and animal species and assist in protecting this unique habitat (see Objectives 4.1 and 4.3).

Additional inventory and research is necessary to identify rare plant and animal species and assist in protecting this unique habitat (see Objectives 4.1 and 4.3). Unit staff would expand partnerships to help conduct inventories, surveys, and research (see Objective 3.1). Bog research would begin by 2016 to inventory and investigate the habitat condition, health, and stability (Objectives 4.1 and 4.3). A WRIA (Objective 1.1) would be necessary to understand the hydrological conditions and potential threats to the bog and other aquatic habitats. This inventory and assessment would assist the Unit staff by identifying management options to monitor and improve habitat conditions.

A thorough inventory of this complex habitat type is necessary prior to implementing an invasive species removal program. More information is needed regarding nonnative plant species within the bog habitat. Known invasive species, including holly and reed canarygrass, in this area would be controlled on approximately 30 percent of the bog habitat annually.

By obtaining general plant and animal inventories, the Unit would gain the knowledge necessary to evaluate the special characteristics and diversity found in this bog habitat and the potential for establishing an RNA with the following characteristics: a rich and complex matrix of mixed conifer forests, bogs, shrub swamps, and spring upwellings which includes the headwaters of the Black River; is mostly undisturbed and in a natural state; contains rare and sensitive bog habitat; and rare and declining plants and animals are associated with the bog habitat (see Map 2). If designated as an RNA, the area would become part of a national network of ecosystems found in relatively pristine condition, managed primarily for their natural ecological processes, and would receive additional attention by potential partners and researchers focusing on research and education (see Objective 3.3).

The Unit may consider translocation of an endangered plant species to its historical range within bog habitat or other habitats that are appropriate. Translocation of any plant species would be part of a formal research program requiring planning and permits (see Objective 4.3). The Service policy for Biological Integrity, Diversity, and Environmental Health (601 FW 3) allows for the reintroduction of extirpated native flora and fauna back to their historic range.

**Black River Unit Objective 1.4: Protect, maintain, and enhance the shrub swamp habitat**

Protect, maintain, and enhance 512 acres of shrub swamp for migratory birds including marshbirds, Oregon spotted frog, Olympic mudminnow, and other native wildlife.

Desired characteristics of shrub swamp include:

- Semi-permanently to permanently flooded with water depths from <1 to 24 inches
- During late summer months, ground has less surface moisture but retains root zone saturation
- Poorly drained, fine-textured organic or muck soils
- Associated with beaver dam-building activity
- 20–50 percent canopy cover of shrubby native, deciduous trees (such as willows, ash, and Pacific crab apple; 15–30 feet high) with lichen and moss growth\*\*
- 50–100 percent canopy cover of native deciduous shrubs (such as red-osier dogwood, ninebark, and black twinberry 5–20 feet high)\*\*
- 10–20 percent coverage (patchy) of native, herbaceous understory plants (such as skunk cabbage, veronica, marsh speedwell, bur-weed, smartweed, and sedges)\*\*
- 20–50 percent patches of exposed soils\*\*
- Low to minimal levels of nonnative bullfrog populations that threaten natural food web processes\*\*
- < 20 percent coverage of nonnative, invasive plants that threaten native plant community processes
- Reduce reed canarygrass (see Rationale in Objective 1.1)\*\*

*\*\*Attributes identified in current and/or proposed inventory, monitoring, and research activities*

<b>Strategies Applied to Achieve Objective:</b>	<b>Alt 1</b>	<b>Alt 2</b>
Monitor and use appropriate IPM techniques, such as mechanical, physical, biological, and chemical methods (see Appendix G), to control invasive or undesirable plant or animal species.	✓	✓
Annually control invasive plants on a minimum of 5 percent of shrub swamp habitat.		✓
Develop methods to select appropriate sample sites in shrub swamp habitat for inventory and assessment. Conduct the inventory and assessment.		✓

**Rationale:**

The Unit supports 512 acres of shrub swamp habitat interspersed with other habitats, such as emergent marshes, bogs, and riparian forests, supporting a wide variety of neotropical migratory

birds, wading birds, small mammals, and invertebrates. It is an essential habitat connecting other key habitat types, providing a buffer to the river channel, reducing the impacts of flooding, and providing food and cover for a diversity of resident and migratory birds including declining species and populations, endemic species such as Olympic mudminnow, rare species including the federally threatened Oregon spotted frog, Pacific clubtail dragonfly, bristly sedge, the federally endangered water howellia, as well as other wildlife.

The shrub swamp habitat dominates the northern most portion of the Unit south of Black Lake, and along the river channel and adjacent floodplain south to 123<sup>rd</sup> Avenue. Identifying presence/absence of invasive species and implementing IPM treatment methods has been found to be extremely challenging due to the difficulty accessing and navigating through the habitat which has been described as an “impenetrable shrub thicket.” Reed canarygrass, yellow flag iris, purple loosestrife, possibly knotweed, and other nonnative, invasive, wetland-adapted plants most likely thrive in small, open patches. If left unchecked, they could negatively affect water flow, habitat function, and key wildlife habitats.

The Unit would expand control measures for invasive plants on a minimum of 5 percent shrub swamp annually. Newly identified, small sized infestations would be targeted for spot treatment to prevent them from spreading. IPM-approved methods would be utilized to control invasive plants (see Appendix H).

See Objective 1.1 and Section 4.6 for the rationale for bullfrog control and treatment.

Although not noted as a strategy for this specific habitat, completing a detailed WRIA on the river system would help identify resource threats and provide details regarding management and protection options.

A complete inventory of the shrub swamp plant community is needed to understand if and how hydrological changes over time affect the bog and shrub swamp habitats (see Objective 4.1).

### **Black River Unit Objective 1.5: Protect, maintain, and enhance the riparian forest habitat**

Protect, maintain, and enhance 265 acres of riparian forest for migratory birds, amphibians, small mammals, and other native wildlife.

Desired characteristics of a riparian forest include:

- Slightly higher elevation than shrub swamp habitat
- Soils are saturated part of the year
- $\geq 75$ –95 percent cover from native deciduous, broadleaf trees of mixed age and species dominated by big leaf maple, western cottonwood, red alder, and Pacific willow\*\*
- Over time, previously logged-out Sitka spruce and western hemlock may grow in with natural succession in the absence of major disturbance
- $\geq 50$  percent native shrubs such as black twinberry, red osier-dogwood, snowberry, salmonberry, thimbleberry, salal, red and evergreen huckleberry, rose species, osoberry, and devil’s club\*\*
- $\geq 40$  percent herbaceous understory such as skunk cabbage, inside-out flower, twinflower, wild ginger, trillium, vanilla leaf, false lily of the valley, stinging nettle, and lilies\*\*

- Diverse lichen and moss growth on trees and shrubs\*\*
- Trees grow to become sufficient size to provide large woody debris to the river channel and floodplain
- Individual trees of >12” diameter and 20+’ long or groups of trees become snags and downed logs.
- ≤ 20 percent nonnative, invasive plants that threaten the native plant community\*\*

*\*\*Attributes identified in current and/or proposed inventory, monitoring, and research activities*

<b>Strategies Applied to Achieve Objective:</b>	<b>Alt 1</b>	<b>Alt 2</b>
Monitor and use appropriate IPM techniques, such as mechanical, physical, biological, and chemical methods (see Appendix G), to control invasive or undesirable plant or animal species.	✓	✓
Within 5 years of acquiring lands, reestablish or enhance altered riparian habitats where appropriate by planting native trees and shrubs.		✓
Manage a minimum of 20 percent of Unit riparian forest habitat annually to control invasive plants.		✓
Establish maintenance staff position for habitat enhancement, invasive species control, and other management activities.		✓

**Rationale:**

Since the late 1800s, the vast majority of riparian habitat in Washington has been lost or extensively modified due to agricultural clearing, logging, construction, and channel alteration activities. Intact riparian forests provide cover and serve as important travel corridors for many wildlife species. Healthy riparian forests also support native fish populations by benefitting in-stream characteristics such as water temperature, water quality, water chemistry, cover, structural diversity from woody debris, and nutrients.

The Unit currently supports 265 acres of riparian habitat for a diverse assemblage of native wildlife such as resident and migratory birds, cavity-nesting waterfowl, possibly great blue heron colonies, and red-legged frogs. Riparian forest habitat is naturally located within floodplain areas and serves as a natural floodwater storage area during high water events.

Maintenance and enhancement of this habitat would contribute to function and health by improving the connectivity for wildlife that is dependent on riparian forests. Management would include evaluating, planting, and using established forestry management techniques to enhance a mix of early, mid-, and late successional riparian forest habitat. This habitat is vulnerable to invasive plant degradation and IPM-approved control methods would be utilized to control this and other invasive plants (see Appendix G).

Establishment of a maintenance staff position is essential for conducting proposed habitat enhancement projects, nonnative invasive plant and animal control, and other daily management projects and activities in the Refuge Complex. This position would support Unit partnerships, visitor services facilities and programs, and habitat enhancement and maintenance projects to benefit wildlife both on and off Unit lands.

**Black River Unit Objective 1.6: Protect, maintain, and enhance emergent marsh habitat**

Protect, maintain, and enhance 34 acres of emergent marsh for amphibians such as Oregon spotted frog, migratory and marsh birds, and other wildlife.

Desired characteristics of this freshwater emergent marsh include:

- Semi to permanently flooded lands with standing water between <2 to 25 inches deep. Deep water conditions occur between October and June
- Provides a pathway for amphibians and fish to deeper water sites
- Located along the river and tributary edges, swales, oxbows, and land depressions that connect to other wetlands and deeper waters
- Topography includes a mosaic of shallow depressions
- Poorly drained soils (peat, muck, or mineral)
- 15–35 percent soil exposure (no vegetation)
- <20 percent moderately high-growing (>4+ feet high) native plants such as cattail, hard or soft stem bulrush, or slough sedge\*\*
- 30–70 percent cover of low-growing, native, emergent, hydrophilic vegetation and seed-bearing plants such as water plantain, bur-reed, sedges, rushes, and creeping grasses\*\*
- Decaying large woody debris in the marsh brought in by high-water events
- Zero to minimal invasive bullfrogs to prey on Oregon spotted frog tadpoles, juveniles, or adults, other amphibians, or other native species\*\*
- < 20 percent coverage of nonnative, invasive plants that threaten the native plant community processes
- Reduce or manage reed canarygrass (see Rationale in Objective 1.1)\*\*

*\*\*Attributes identified in current and/or proposed inventory, monitoring, and research activities*

<b>Strategies Applied to Achieve Objective:</b>	<b>Alt 1</b>	<b>Alt 2</b>
Develop an array of appropriate IPM techniques, such as mechanical, physical, biological, and chemical methods, including mechanical mowing, haying, selective hand-cutting and thatch removal, herbicides, herbivore grazing, prescribed fire, water control methods, or barrier cloth placement, that are minimally detrimental to rare or declining species populations such as Oregon spotted frog or water howellia (see Appendix G).	✓	✓
Continue partnerships with other agencies to develop and implement reed canarygrass management in non-diked emergent marshes and enhance native and nonnative grassland habitats.	✓	✓
Annually manage a minimum of 20 percent of emergent marsh habitat to control invasive plants and enhance habitat, especially for Oregon spotted frog.		✓
Move stranded Oregon spotted frog eggs into nearby water as appropriate.	✓	✓

**Rationale:**

The Refuge supports approximately 34 acres of emergent marsh habitat found in patches along the edge of the river and tributary channels. This important habitat is vital for providing Oregon spotted frog breeding and egg-laying locations. Thurston County's Oregon spotted frog population is the second largest in Washington State.

Emergent marsh habitat has perhaps the most reed canarygrass. Staff would expand IPM control measures on an additional 20 percent of the habitat specifically to benefit the rare and declining Oregon spotted frog. Unit staff would continue to work with partners and seek new partnerships to develop and implement new techniques for controlling reed canarygrass (see Appendix H). The Unit would work with Natural Resources Conservation Service on Workforce Recruitment Program lands to reduce the negative impacts reed canarygrass causes to Oregon spotted frog and to improve habitat for Oregon spotted frog use.

Unit staff would continue to monitor and manage all known Oregon spotted frog use sites and expand inventory areas on the Unit to identify oviposition and overwintering sites (see Goal 4). Promoting the survival of the Oregon spotted frog, staff would continue to relocate the few stranded egg masses laid each year to safer habitat as necessary. Enhanced inventories and surveys would be necessary to identify the presence of the federally listed plant, water howellia, which is suspected to occur on the Unit.

See Objective 1.1 and Section 4.6 for the rationale for bullfrog control and treatment.

**Black River Unit Objective 1.7: Manage and enhance seasonally flooded, nonnative grassland habitat**

Manage 82 acres of seasonally flooded, nonnative grasslands for amphibians such as Oregon spotted frog, migratory and marsh birds, and other wildlife.

Characteristics of these wet, nonnative grasslands include:

- Dominated by combination of pasture grasses and reed canarygrass
- Former farm-, crop-, or pasturelands
- 0–25 percent remnant emergent marsh or shrub swamp species
- Located along the river and tributary edges, swales, oxbows, and land depressions that connect to other wetlands and deeper waters
- Annual high surface water conditions between November and May ranging from 5 inches to 4 feet of standing water depth, depending upon land elevation
- Surface water levels drop throughout the summer resulting in dry, moist, or saturated soils in early fall
- A portion of this habitat may be minimally appropriate for amphibian (including Oregon spotted frog) breeding and egg-laying conditions in late winter or early spring\*\*
- Connection to deeper water sites in early summer for frog or tadpole movement
- Water conditions that may support rearing juvenile Oregon spotted frog in late spring and early summer\*\*
- Algal growth on the monoculture reed canarygrass vegetation provides some juvenile amphibian foraging opportunities
- Zero to minimal levels of nonnative bull frog populations\*\*

- Managed reed canarygrass

*\*\*Attributes identified in current and/or proposed inventory, monitoring, and research activities*

<b>Strategies Applied to Achieve Objective:</b>	<b>Alt 1</b>	<b>Alt 2</b>
Develop and implement an array of effective techniques (including IPM strategies) to contain, control, manage, or retard reed canarygrass in difficult-to-access conditions. Manage this habitat using a variety of tools such as mechanical, physical, biological, herbicide, or chemical methods, which include mowing, haying, selective hand-cutting and thatch removal, disking or tilling, fertilizing, herbicides, herbivore grazing, prescribed fire, water control methods, barrier cloth placement, and/or planting more appropriate plant species.	0.75 acres	Up to 25 acres
Continue partnerships with other agencies to develop and implement reed canarygrass management in non-diked emergent marshes and seasonally flooded habitats.	✓	✓
Use IPM methods to manage reed canarygrass growth and create low grass, moist soil conditions.	✓	✓
Manage reed canarygrass on all known Oregon spotted frog breeding sites as needed to enhance egg-laying, larval, and juvenile frog development.		✓
Move stranded Oregon spotted frog eggs into nearby water as appropriate.	✓	✓
Evaluate and enhance seasonally ponded areas and improve water management capabilities as needed through installation of water control structures, ditch or culvert removal, and improvements to water level management capabilities.		✓

**Rationale:**

Historically, this seasonally flooded, nonnative grassland habitat was likely healthy emergent marsh habitat. However, over time, nonnative grasses used for agricultural purposes have dominated and changed the former emergent marsh habitats. The Unit manages approximately 82 acres of seasonally flooded, nonnative grassland habitat that supports a variety of species including Oregon spotted frog, migratory and marsh birds, and other wildlife.

The Unit focus would be to implement and increase Oregon spotted frog management activities by improving breeding sites, enhancement of egg-laying areas, and expansion of juvenile frog-rearing habitat.

Seasonally ponded areas would be evaluated and water management capabilities may be improved through the installation of water control structures and/or ditch or culvert removal in order to achieve appropriate water conditions for Oregon spotted frogs. Per WDFW (2013), the hydrological needs for Oregon spotted frogs are summarized thusly:

Watson et al. (2000) found that different life stages of Oregon spotted frogs had different hydrological needs that varied by season. For development of eggs and larvae, relatively stable water levels were needed during the breeding season. For survival of transformed frogs, deeper water pools were critical during the summer dry season. Adequate water levels over emergent vegetation were important for survival of all age classes during the wet season and coldest time of the year. A topographic gradient with overall gradual relief was vital for providing this mix of aquatic conditions and aquatic connectivity between areas used. Watson et al. (2003) stressed that the most important features for microhabitat use were water depth, flow characteristics (still water was used over flowing water) and a high degree of water surface exposure (i.e., 50–75% water) or conversely, a low to moderate degree of emergent vegetation (i.e., 25–50%). The predominant use of shallow water habitat by Oregon spotted frogs was illustrated by Watson et al. (1998, 2003), who found Oregon spotted frogs (n = 295 radio-telemetry locations) selected water depths of 10–30 cm (~4–11.7 in.) with less emergent vegetation and more submergent vegetation than adjacent habitats.

Nonnative grasses, such as reed canarygrass and other pasture grasses, have increased the habitat management challenges and made restoration efforts nearly impossible in some areas. To manage nonnative grasses and provide the best Oregon spotted frog breeding habitat requires an intensive management program that includes herbivore grazing and mowing of the nonnative grasslands.

Unit staff would seek partnerships to develop effective IPM techniques to control and manage nonnative grasses such as reed canarygrass where feasible.

Staff would continue to monitor Oregon spotted frog populations and evaluate habitat improvement projects (see Objective 4.1–4).

**Goal 2. Protect and maintain upland habitats characteristic of the upper Black River watershed.**

**Black River Unit Objective 2.1: Protect, maintain, and enhance dry, nonnative grassland habitat**

Protect, maintain, and enhance 163 acres of dry, nonnative grassland for species that depend upon open, short, forbacious, upland grassland conditions such as migratory birds and other wildlife.

Characteristics of nonnative grasslands include:

- Well-drained soils in upland areas, may have been former croplands, pasturelands, or forests
- ≥ 30-acre patches of low-growing vegetation
- Mosaic of vegetation heights between 6 and 36 inches
- Mix of desirable, palatable grasses such as native Roemer’s fescue, red fescue, California oatgrass, and nonnative grasses such as velvet and timothy\*\*
- Mix of native and nonnative forbs to benefit pollinators such as early blue violet, large leaf lupine, pearly everlasting, northwest cinquefoil, yarrow, aster, blue-eyed Mary, goldenrod, clovers, and alfalfa\*\*
- Contain a single or occasional patch of large growing, cavity-producing trees such as big leaf maple or Garry oak
- Native shrubs form a border around the grasslands and provide transitional habitat for nesting cover and roosting habitat for birds and provide dispersal habitat for small mammals
- Minimal human disturbance to wildlife populations, especially during spring nesting season and winter use by elk and migratory birds
- ≤5 percent cover of nonpalatable/invasive plants such as burdock, broom, teasel, thistle, or blackberries\*\*

*\*\*Attributes identified in current and/or proposed inventory, monitoring, and research activities*

Strategies Applied to Achieve Objective:	Alt 1	Alt 2
Monitor and use appropriate IPM techniques, such as mechanical, physical, biological, and chemical methods (see Appendix G), to control invasive or undesirable plant or animal species.	✓	✓
Maintain dry, nonnative grasslands in appropriate early successional stage, as open savannah-like habitats to benefit open, short-grassland-adapted species. Techniques may include mechanical mowing, haying, fertilizing, herbicides, herbivore grazing, prescribed fire, barrier cloth placement, invasive plant control, seeding, and/or planting native plants.	163 maintained acres	148 maintained acres
Achieve greater composition of native grasses and forbs by enhancing 15 acres. Techniques may include mechanical mowing, haying, fertilizing, herbicides, herbivore grazing, prescribed fire, barrier cloth placement, invasive plant control, seeding.		15 acres enhanced
Identify potential enhancement sites for native grasses and forbs.		✓

<b>Strategies Applied to Achieve Objective:</b>	<b>Alt 1</b>	<b>Alt 2</b>
Plant 3–5 big leaf maples and/or Garry oaks where appropriate on approximately 50-acre blocks to provide habitat for cavity-nesting birds and enhance grassland habitat diversity to benefit appropriate species. Protect solitary or interspersed big leaf maple or Garry oak trees within nonnative grasslands by placing tree collars, fencing saplings, and similar habitat enhancement measures.		✓
Hire permanent maintenance worker to conduct habitat management and enhancement in uplands and wetlands, invasive control work, and maintain posting and signing needed to protect Black River Unit habitats.		✓

**Rationale:**

Historically, this habitat may have been grasslands maintained by Native American burning practices or possibly late successional forest habitat before the habitat was converted for agricultural purposes in the late 1800s. It is not classified as prairie because it lacks the appropriate soil types normally associated with prairie habitats in the Black River watershed. However, because so little native prairie remains in Thurston County, these grasslands, with some enhancement, can help support species that prefer larger, open spaces of short grass, flowering herbaceous plants, and an occasional large cavity-producing tree that provides perches and nesting cavities. Ideally a transition area of shrubs would provide an area of cover for animals utilizing both grasslands and woodlands.

The Unit supports 163 acres of dry, nonnative grassland habitat, which consists of a mixture of mostly nonnative grasses, nonnative forbs, and shrubs that function to support a wide variety of birds and animals.

The Unit would conduct active management on 148 acres of this nonnative grassland habitat by mowing, haying, and controlling invasive plants to maintain an early successional stage of open, savannah-like habitat. Grassland-oriented species, including resident and migratory birds such as western meadowlark, American kestrel, and owls; foraging herbivorous waterfowl such as geese and American wigeon; pollinators such as butterflies, moths, and hummingbirds; and wintering ungulates such as black-tailed deer, would benefit from early successional stage habitat.

The Unit would identify and enhance a minimum of 15 acres with native grass and native forb species to benefit native pollinators, other native insects, birds, and other native animals. Enhancement techniques to achieve the desired plant compositions may include mechanical mowing, haying, fertilizing, herbicides, herbivore grazing, prescribed fire, barrier cloth placement, invasive plant control, seeding, and/or planting native plants. IPM techniques would be utilized to control and monitor undesirable and nonpalatable plant species (see Appendix G).

Unit staff would establish and protect a few big leaf maples and/or Garry oaks on approximately 50-acre blocks to provide habitat for passerine and raptor perching, cavity-nesting birds such as owls, and bat roosting to enhance both habitat and wildlife diversity.

**Black River Unit Objective 2.2: Protect, maintain, and enhance upland mixed forest habitat**

Protect, maintain, and enhance 394 acres of mixed forest for migratory birds, mammals, and other native wildlife.

Desired characteristics of a good quality mixed forest include:

- Well-drained soils that are moist much of the year and dry for approximately 3–4 months
- As stands mature, Douglas-fir, grand fir, western hemlock, western red cedar, and big leaf maple dominate the canopy as early successional red alder becomes less dominant\*\*
- Selected individual trees or groups of trees of >12” diameter and 20’ long become snags and logs and enhance diversity
- Mid-story and understory development depend upon forest maturity, moisture, and light availability and may include yew, salal, salmonberry, osoberry, tall Oregon grape, beaked hazel, vine maple, red, evergreen, and black huckleberry, trailing blackberry, twinflower, inside-out flower, wild ginger, sorrel, Pacific bleeding heart, starflower, trillium, columbine, and bunchberry\*\*
- < 10 percent cover of invasive plants in the mid- and understory layers

*\*\*Attributes identified in current and/or proposed inventory, monitoring, and research activities*

<b>Strategies Applied to Achieve Objective:</b>	<b>Alt 1</b>	<b>Alt 2</b>
Monitor and use appropriate IPM techniques, such as mechanical, physical, biological, and chemical methods (see Appendix G), to control invasive or undesirable plant or animal species.	✓	✓
Annually control or manage invasive species in a minimum of 20 percent of mixed forest habitat.		✓
Evaluate and manage forests through various forest management practices (variable density stand thinning, etc.) to convert young stands into structurally diverse mature forests that include diverse mid- and understory development.		5–10 acres

**Rationale:**

Mixed forest habitats are abundant throughout the southwest Washington region. This upland mixed forest habitat type is made up of a variety of deciduous and coniferous trees found in a mosaic of successional stages important for wildlife diversity. Most upland areas on the Unit are young forest stands recovering from logging and currently include a predominance of young Douglas-fir. No old-growth forest is located on Unit lands, and forests over 80 years are rare in this watershed. This younger age-class lacks the density of snags that are found in older forests.

The Unit would encourage upland mixed forests to mature over time into old-growth forests that might eventually support rare species such as the marbled murrelet and Northern spotted owl. Linkage between conifer forests of Capital State Forest, Unit upland mixed forests, riparian forests, and swamps provide habitat corridors for wildlife to move as seasons dictate or food requirements change. Forest enhancement and linkage would benefit many species of wildlife associated with this

habitat type including many species of landbirds, both resident and migratory, many myotis bat species, as well as silver-haired and hoary bats, many small rodent species, including mountain beaver, Douglas and flying squirrels, Townsend's chipmunk, and larger mammals such as elk, black-tailed deer, black bear, and mountain lion.

Forest management would include a thorough evaluation of the Unit forests and overall forest health with the aid of partners such as USDA Forest Service, Pacific Northwest Research Station. Forest management practices (variable density stand thinning, etc.) would be implemented on a minimum of 5–10 acres to transition young stands into structurally diverse forests that include multi-species mid- and understory development.

To maintain the health and diversity of the habitat, Unit staff would manage invasive species, such as reed canarygrass, Scotch broom, and nonnative blackberry, on a minimum of 20 percent of mixed forest habitat (see Appendix H).

**Goal 3. Contribute to the protection and long-term environmental health of the greater Black River watershed and ecosystem.**

**Black River Unit Objective 3.1: Develop and strengthen partnerships**

The Unit would initiate, develop, and continue to strengthen existing partnerships with interested groups for the benefit of the long-term environmental health of native wildlife and their habitats.

Partnership actions include:

- Working with and involving local communities, Tribes, universities, landowners, NGOs, agencies, and other interested parties
- Identifying the Service’s role in conservation efforts with the focus on partnerships that provide support for natural resources
- Utilizing existing and supporting new eco-regional plans and priorities
- Working with and assisting others in the recovery of threatened and endangered species\*\*
- Working with others and assisting with management objectives, resource protection, and research\*\*
- Working with others to control and manage nonnative plants and enhance habitats\*\*
- Considering and participating in climate change initiatives and research\*\*

*\*\*Attributes identified in current and/or proposed inventory, monitoring, and research activities*

<b>Strategies Applied to Achieve Objective:</b>	<b>Alt 1</b>	<b>Alt 2</b>
Continue to work with partners such as the Thurston County Noxious Weed Control Board (TCNWCB) to continue coordinated control efforts and monitoring of invasive plant and animal species.	✓	✓
Continue to participate and coordinate with the Washington and Oregon Spotted Frog Working Group partners to plan and implement recovery strategies both on- and off-Refuge. (Objectives 1.1, 1.2, 1.4, 1.6, 1.7, 4.3.)	✓	✓
Maintain and improve partnerships with natural resource agencies, Tribes, NGOs, and private companies involved in land management and restoration at Black River.	✓	✓
Work with State, county, Tribes, and other partners to develop a plan (based on a completed WRIA) to ensure an appropriate water budget and delivery conditions (water quality and quantity) are sustained in the Black River and tributaries. (see Objectives 1.1, 1.2, 1.3, 1.6, 1.7 )		✓
Endorse and partner (where feasible) with public and private organizations, Tribes, and adjacent landowners to maintain and enhance connectivity of native plant communities and habitat quality on lands adjacent to the Refuge and other protected lands in the watershed.		✓
Partner with the TCNWCB and others to provide education and outreach opportunities, including with local landowners, on invasive plant control and the impacts of invasive plants to the habitat and methods of reducing and controlling infestations.		✓

<b>Strategies Applied to Achieve Objective:</b>	<b>Alt 1</b>	<b>Alt 2</b>
Partner to educate and encourage private landowners to maintain healthy habitats for fish, amphibians, and native wildlife.		✓
Coordinate with partners to develop and/or evaluate suitability of techniques to control populations and reproduction of invasive frogs and invertebrates.		✓
Partner with interested agencies to determine an array of effective techniques (including IPM strategies) available to contain, control, or manage reed canarygrass in difficult wetland conditions.		✓
Work with partners to locate, protect, and conserve land within the watershed, especially priority habitats such as bogs and emergent marsh and rare and declining species.		✓
Endorse and partner (where feasible) with public and private agencies and adjacent landowners to maintain and enhance connectivity of native habitats, habitat quality, and native plant communities within the watershed.		✓

**Rationale:**

The approved Unit boundary includes only the northern portion of the Black River, and further acquisition is ongoing. The limited size of current ownership limits the Unit’s ability to provide landscape-level benefits, such as greater watershed protection and buffers for sensitive habitats and species.

Achieving landscape-level habitat protection would require partnerships beyond the Unit boundary. Unit staff would work to develop new partnerships to provide the necessary habitat monitoring, protection, resources, and educational information to help maintain the Black River ecosystem in a healthy, sustainable condition. Conservation projects occurring near the Unit also strengthen habitat and wildlife protection inside the Unit boundaries. By developing and strengthening partnerships, conservation of the Black River watershed would be more effective by combining efforts and leveraging financial and technical resources from other entities (other governmental organizations, NGOs, Tribes, and private landowners). Whenever possible the Unit would seek to engage private landowners in voluntary conservation projects to enhance the health of wildlife habitat and protect water quality. Through an active role in local, State, Tribal, and Federal partnerships, Unit staff would work to improve and protect water quality and the ecological integrity of the Black River Watershed.

Partnerships include the Chehalis Tribe, Capitol Land Trust, Port Blakely, Center for Natural Land Management, TCNWCB, Thurston County, Thurston Conservation District, Washington Department of Ecology, WDFW, WDNR, and the Service’s Washington Fish and Wildlife Office. Conservation efforts would continue to focus on protecting and enhancing habitats locally by participating in various groups such as the Washington Oregon Spotted Frog Working Group, Chehalis River Cooperative Weed Management Working Group, and others to implement working-group strategies and goals shared by the Unit.

**Goal 4. Gather scientific information (inventories, monitoring, and research) to support adaptive management decisions.**

**Black River Unit Objective 4.1: Inventory**

Conduct scientific inventories to provide information regarding the status of Unit resources and better guide resource management decisions. These scientific inventories and surveys would contribute to the development of Unit resource objectives. They would also facilitate habitat restoration through selection of appropriate habitat management strategies based upon site-specific conditions.

These inventory activities would have the following attributes:

- Inventory habitats, species or species groups according to the Unit’s approved I&M Plan and associated protocols
- Scale, accuracy, and completeness of inventories that would be appropriate for development and implementation of Unit habitat and wildlife management actions
- Data collection techniques that would reduce animal mortality, disturbance, and habitat destruction
- Proper cleaning of investigator equipment and clothing and use of quarantine methods, where necessary, to minimize the potential spread or introduction of invasive species and disease

<b>Strategies Applied to Achieve Objective:</b>	<b>Alt 1</b>	<b>Alt 2</b>
Develop a Unit I&M Plan within 3 years of CCP completion that provides the management rationale, timing, and costs for conducting Refuge surveys; lists the prioritized surveys; identifies the surveys selected for implementation; and documents the protocols that describe the survey objectives and methods.	✓	✓
Implement the Black River Unit I&M Plan within 5 years on currently owned tracts and within 2 years of acquiring any new tracts; create a plan for appropriate habitat enhancement.		✓
Characterize all known Oregon spotted frog oviposition sites, including habitat, elevation, and hydrology, to provide a comparison for future monitoring.		✓
Inventory new areas and identify new oviposition locations for Oregon spotted frog (see Objective 1.2).	✓	✓
As tributary and river channel habitat is acquired, assess each for key biotic and abiotic characteristics and potential enhancement needs (see Objectives 1.1 and 1.2).		✓
Partner with appropriate science experts to find, classify, and map all bog sites on the Unit. (Objectives 1.3 and 3.3)		✓
Conduct inventory of terrestrial and wetland plants in existing and any newly acquired tracts to determine nonnative plant species presence, relative abundance, and determine the need for nonnative species control.		✓

<b>Strategies Applied to Achieve Objective:</b>	<b>Alt 1</b>	<b>Alt 2</b>
Conduct submerged plant inventory to determine presence or absence of invasive species growing in the river and tributary channels.	✓	✓
Conduct presence or absence inventories on nonnative animal populations and evaluate distribution and relative abundance in key habitats.		✓
Within 5 years of CCP completion, begin inventories for bullfrog concentrations and their egg-laying locations. Survey first at known Oregon spotted frog oviposition habitats.		✓
Conduct inventories to gather data (presence/absence, habitat use, relative abundance) on wildlife species such as small mammals (e.g., rodents, bats), amphibians, reptiles, invertebrates, and pollinators.		✓

**Rationale:**

An inventory is defined as a survey that estimates the presence, abundance, or distribution of species, habitats, ecological communities, or abiotic features at a particular time (701 FW 2). Inventories may also establish a beginning time-step (baseline) or reference information for subsequent monitoring. For example, a well-designed inventory may be repeated at a later time to assess the status and trends in the same location, which would then be considered monitoring. Inventories would provide fundamental information about biotic (e.g., vegetation data) as well as abiotic processes and conditions (e.g., water quality, water flow) that are necessary to ensure that implementation of on-the-ground resource management achieves the resource management objectives identified under Goals 1–3.

Specifically for the Black River Unit, a Unit I&M Plan needs to be developed to document the surveys required to determine species status, assess habitat condition, detect changes in diverse fish, wildlife, and plant communities and physical resources including water, air, and soils and ecological processes. The I&M Plan would include information on the specific metrics required for supporting management decision-making and may include presence/absence, species composition, seasonal habitat use, spatial distribution, and/or population estimates. Field work to inventory biological status of current and newly acquired lands would take place on each of the habitats, especially in the bog habitat.

Funds are currently prioritized to perform the most pressing projects on the Nisqually National Wildlife Refuge Complex, leaving few resources and staff available to conduct Black River-specific baseline assessments. Partnering with other field biologists from natural resource agencies, NGOs, private lands, and using qualified volunteers would be instrumental in accomplishing these inventories.

**Black River Unit Objective 4.2: Monitoring**

Conduct high-priority monitoring activities that evaluate changes in the status of fish, wildlife, and their habitats. The information gathered facilitates adaptive management actions for resource management and public use activities. Monitoring projects can take place annually or periodically depending on species, habitat, or management needs.

Monitoring of wildlife and habitat contributes to the enhancement, protection, use, preservation, and management of wildlife populations and their habitats on and off Unit lands. Information gained can be used to evaluate achievement of resource management objectives identified under Goals 1–3.

These monitoring and survey activities have the following attributes:

- Projects would adhere to scientifically defensible protocols for data collection, where available and applicable
- Data collection techniques should have minimal animal mortality, disturbance, habitat destruction
- Minimum number of samples (e.g., water, soils, vegetative litter, plants, macroinvertebrates, vertebrates) to meet statistical analysis requirements would be collected for identification and/or experimentation in order to minimize long-term or cumulative impacts
- Proper cleaning of investigator equipment and clothing and use of quarantine methods, where necessary, would minimize the potential spread or introduction of invasive species and disease

<b>Strategies Applied to Achieve Objective:</b>	<b>Alt 1</b>	<b>Alt 2</b>
Within 3 years of CCP completion, develop a Unit I&M that provides the management rationale, timing, and costs for conducting Refuge surveys; lists the prioritized surveys; identifies the surveys selected for implementation; and documents the protocols that describe the survey objectives and methods.	✓	✓
Monitor and assess condition and availability of appropriate habitats for rare, declining, federally or State-listed, and priority species or species groups.		✓
Annually conduct Oregon spotted frog egg surveys to assess population status and habitat use (see Objective 1.6).	✓	✓
Annually assess Oregon spotted frog oviposition site locations for habitat enhancement opportunities.		✓
Monitor to determine if Oregon spotted frog eggs develop successfully when laid on reed canarygrass leaf mats in deep water.		✓
Annually monitor the effects of habitat enhancement project success in Oregon spotted frog oviposition habitat using frog-egg-mass numbers and location (see Objective 1.6).		✓
Monitor the effectiveness of any bullfrog control methods to benefit Oregon spotted frog, other amphibians, small fish, birds, and invertebrates.		✓
Partner with other agencies or groups to periodically monitor the river and tributary channel(s) within Unit boundaries for water quality, quantity, flow rate, turbidity, dissolved oxygen, pH, nutrients, connectivity, and other parameters to benefit all native species and nearby wetland habitats.		✓
Within 5 years, specifically establish a long-term bog habitat monitoring program to look at habitat condition, threats, and changes over time.		✓

<b>Strategies Applied to Achieve Objective:</b>	<b>Alt 1</b>	<b>Alt 2</b>
Include monitoring of plant and animal species composition and density, ground pH, nutrient levels, soils, hydrology, and incorporate the I&M Plan (see Objective 1.3).		
Periodically monitor for potential biological integrity threats that may develop in habitats NOT targeted for enhancement to benefit species that use those habitats.		✓
Periodically monitor actively managed or enhanced habitats to assess response by key avian, mammalian, and other wildlife species to support adaptive management.		✓
Annually survey at least 0.5 miles of the river or tributaries for nonnative submersed plants in the channels (see Objectives 1.1 and 1.2).		✓
Survey, GPS, and map the invasive, nonnative reed canarygrass along the river channel and monitor changes over time (see Objective 1.1).		✓
Survey, GPS, and map locations of yellow flag iris, purple loosestrife, reed canarygrass, and other specific nonnative or invasive plant species threatening Unit wetlands. If plants are found, implement IPM control strategies (see Appendix G).	✓	✓
Continue to partner with agencies to monitor effectiveness of various management techniques used to control, contain, or manage reed canarygrass to learn most efficient, useful, effective, and long-term methods for the benefit of Oregon spotted frog and other wildlife.	✓	✓
Periodically monitor nonnative animal control effort efficacy, if implemented, in specific wetland habitats and monitor wildlife response (presence/absence) to nonnative animal removal over time.		✓
Annually monitor all enhanced habitats for invasive plant regrowth and needed treatment.		✓
Monitor results of Landscape Conservation Cooperative and other large-scale and long-term monitoring and research efforts to assess resilience of refuge habitats to changing climate trends.		✓
Work with partners to monitor environmental factors that are climate change-related stressors (e.g., changes to hydrology, water temperature).		✓
Establish a biological technician position to focus on wildlife and habitat surveys and monitoring of trends and changes in plant and wildlife populations.		✓

**Rationale:**

Monitoring consists of repeated survey efforts intended to document changes over time (e.g., months to years) and space in select attributes of wildlife, plants, habitats, ecological communities, or abiotic resources. Two types of monitoring in the Service policy (701 FW 2) are:

(1) Baseline monitoring. Monitoring that is not tied to specific predictions of how a natural resource will respond to management or environmental stressors, but instead is designed to document change over time of a natural resource. Examples include monitoring wildlife population trends, disease incidence, and climate change.

(2) Monitoring to inform management. Monitoring to assess whether a natural resource is approaching or exceeding a known threshold, or if a resource is responding to a management action or system stressor in a specified manner. This type of monitoring involves defining the threshold values or expected response, then surveying to measure the response or a closely related indicator. Comparing monitoring results with these expected values may show a need for initiating, intensifying, or altering management actions. Results from this type of monitoring are used in an adaptive management context to improve management or evaluate progress toward achieving management objectives, as derived from the Refuge System mission and Refuge purposes.

Periodic monitoring for rare and sensitive species, as well as key avian, mammalian, and/or other wildlife species would provide information on their status and habitat quality. Species response to habitat enhancements would need to be understood to adapt management techniques. As noted in Objective 4.1 and Chapter 4 the bog habitat and potential RNA may include a complex mosaic of habitats and species that are very sensitive to abiotic changes and require close monitoring.

Working with partners to monitor Oregon spotted frog on Unit lands has been ongoing and with increased monitoring, would provide critical information on the frog populations, habitat usage, and habitat quality. Additionally, long-term monitoring of bullfrog presence/absence is important for continued Oregon spotted frog survivorship. Monitoring habitat manipulation efforts and results, especially to control reed canarygrass, would assist managers in learning and adapting techniques to further enhance habitats. Monitoring fish and wildlife response to habitat manipulations would help guide managers to support sound management decisions and provide higher quality habitat.

Most wetland habitats in the Black River Unit are difficult and time consuming to physically access, and walking or paddling are challenging. Extensive field work is needed to survey and monitor habitats, fish and wildlife, rare and sensitive species, and specific responses of animals to management techniques. The current, single biologist for the three refuges in the Nisqually National Wildlife Refuge Complex would not be able to conduct all of the needed Black River Unit monitoring activities, even with partner and volunteer assistance. Because of the work load, a new biological technician position is needed to help conduct habitat inventory and monitoring projects in the field, enter data, work with partners, and assist researchers.

The Unit would partner with natural resource entities, specifically the North Pacific LCC, to address climate change and other biological stressors. As needed, objectives and strategies would be adjusted to assist in enhancing Unit resources' resiliency to climate change, and to potentially manage for new species assemblages in the future.

The Unit would monitor wildlife corridor analyses, research potential shifts in species distributions and/or timing of migration, vulnerability assessments, and other efforts, including those underway at a landscape scale, such as the North Pacific LCC. LCCs are formal science-management partnerships between the Service, other Federal agencies, States, Tribes, 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 would be adjusted to assist in enhancing Unit resources' resiliency to climate change, and to potentially manage for new assemblages of species in the future.

**Black River Unit Objective 4.3: Research**

Conduct high-priority scientific research projects that provide the best science for habitat and wildlife management on- and off-Unit. These research projects may identify cause-and-effect relationships, produce new knowledge, and last 1–3 years. Scientific findings gained through these projects would expand knowledge regarding life-history needs of species and species groups as well as identify or refine habitat and wildlife management actions.

Research would also reduce uncertainty regarding wildlife and habitat responses to Unit management actions in order to achieve desired outcomes reflected in resource management objectives and facilitate adaptive management.

These research projects would 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 would likely have minimal animal mortality, disturbance, and 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 and disease
- Often result in peer-reviewed articles in scientific journals and publications or symposiums

<b>Strategies Applied to Achieve Objective:</b>	<b>Alt 1</b>	<b>Alt 2</b>
Within 5 years, set up research to investigate the status and long-term condition of known bog habitat, including general plant and related animal species composition, hydrological conditions and needs, and relative health and stability of this rare plant community.		✓
Continue to participate in studies to develop an array of effective methods to contain, control, manage, or retard rank reed canarygrass in wet and wetland conditions and implement as methods are developed.	✓	✓
Investigate effective IPM control techniques specifically for reed canarygrass that is invading river and tributary channels and apply to 0.25 miles annually as effective, feasible techniques are developed.		✓

<b>Strategies Applied to Achieve Objective:</b>	<b>Alt 1</b>	<b>Alt 2</b>
Within 7 years of CCP completion, develop effective techniques to reduce known populations of nonnative bullfrogs using IPM methods and implement and monitor where needed in key locations based on survey results.		✓
Develop research projects with the help of qualified researchers to explore factors affecting priority wildlife species and their habitats, with the intent to increase our understanding and ability to manage these resources.		✓
Seek funding and support partnerships to conduct a hydrological modeling study of the entire Black River system to identify impairments, management needs, and identify feasible measures to improve water quality and flows for natural resource management and improvements in the watershed.		✓
Coordinate with partners to develop and/or evaluate suitability of techniques to control populations and reproduction of invasive frogs and/or invertebrates without negatively affecting salmonids, Olympia mudminnow, Oregon spotted frog, or rare or declining species in the Black River ecosystem.		✓
Examine ephemeral Oregon spotted frog habitats and connectivity to permanent water locations during the dry seasons, and determine the value and/or threats of artificially connecting isolated marshes.		✓
Conduct research to examine survivorship of Oregon spotted frog eggs, larvae, tadpole and juvenile frogs, habitat use, and investigate predation and other threats.		✓
Support partnerships to investigate Oregon spotted frog ecology and nonbreeding habitat use and needs to provide information to support habitat management and land protection decisions.		✓
Determine the threats and challenges to Oregon spotted frog that could be reduced through adaptive management.		✓

**Rationale:**

Research projects on Unit lands would address a wide range of natural and cultural resources. Examples of research projects include habitat use and life-history requirements for specific species/species groups, practical methods for habitat management and enhancement, extent and severity of environmental degradation, including water loss or contamination, techniques to control or eradicate pest species, effects of climate change on environmental conditions and associated habitat/wildlife response, or modeling of wildlife populations. Projects may be species-specific, Unit-specific, or evaluate the relative contribution of the Unit to larger landscape (ecoregion, region, flyway, national, international) issues and trends. Like monitoring, results of research projects would expand the best available scientific information and potentially reduce uncertainties to promote

transparent decision-making processes for resource management on Unit lands. In combination with results of surveys, research would promote adaptive management on Unit lands.

Specific research needs in the Black River Unit include developing and implementing more effective yet practical methods to control reed canarygrass without having the ability to control water levels. Special attention and study is needed to learn cost efficient, practical methods to control or reduce reed canarygrass density in all wetland habitats but especially in the river and tributary channels, while minimizing impacts to aquatic residents. One of the challenges of developing reed canarygrass management techniques for use in the river is the difficulty in accessing sites.

Ensuring that enough high-quality water flows through the river and tributaries and provides an adequate hydrologic regime for the mosaic of associated wetlands is of utmost importance to the Unit purpose and function. A WRIA of the Black River system is needed to identify impairments, management needs, and feasible measures to improve water quality and flows for natural resource management and improvements in the watershed. This information is vital to effectively managing the Unit.

The Unit would monitor wildlife corridor analyses, research on potential shifts in species distributions and/or timing of migration, vulnerability assessments, and other efforts, including those underway at a landscape scale, such as the North Pacific LCC.

***Goal 5. Provide quality opportunities for visitors to experience a diversity of wildlife and habitats to enhance their understanding and appreciation of the Black River Unit’s natural resources and foster a connection with nature.***

**Black River Unit Objective: 5.1 Welcome and Orientation**

Provide visitors with welcoming and orienting features, facilities, and experiences. These would be characterized as follows:

- Refuge sign
- Information kiosk
- Orientation signs
- Signs directing visitors to a parking area
- Use of electronic and print media to reach and orient visitors

<b>Strategies Applied to Achieve Objective:</b>	<b>Alt 1</b>	<b>Alt 2</b>
Install a Unit sign at the vehicle pull-off area on the west side of Endicott Road when it is developed.		✓
Work with WDFW to provide Watchable Wildlife signs.		✓
Develop a brochure for the Unit.		✓
Provide electronic and print media with accurate information that is positively worded and available at the Unit kiosk and other local venues such as the Chamber of Commerce.		✓

**Rationale:**

Customer service and first impressions are important to visitors feeling welcome and safe at national wildlife refuges. Visitors to the Black River Unit do not necessarily know they are on a unit of a national wildlife refuge and need welcome and orientation features that are easily found and well maintained. Materials should provide accurate, timely, and appropriate information on Unit facilities, programs, and experiences. These strategies would increase Unit visibility and promote visitor compliance with Unit regulations.

**Black River Unit Objective: 5.2 Provide high-quality wildlife observation and nature photography, interpretation and environmental education opportunities**

Provide compatible wildlife observation and photography, interpretation and environmental education opportunities with the following characteristics:

- Facilities are safe, fully accessible, and available to a broad spectrum of the public
- Opportunities exist to view and photograph a diversity of wildlife in their natural habitat and setting
- Access is provided to several habitat types, but mainly the river habitat
- Viewing opportunities are tied to interpretive and educational opportunities
- Observation opportunities promote public understanding of the Unit’s resources and its role in managing and protecting those resources

- Observation occurs in places with the least amount of disturbance to wildlife
- Observers have minimal conflict with other visitors or operation of the Unit

<b>Strategies Applied to Achieve Objective:</b>	<b>Alt 1</b>	<b>Alt 2</b>
Design and install a vehicle pull-off area with interpretive signs on west side of Endicott Road for wildlife viewing. The area could accommodate several parked cars and a pull-through for cars and buses to stop briefly for wildlife and habitat viewing.		✓
Provide interpretive and regulatory signage at the vehicle pull-off area.		✓
Install a small viewing deck at the vehicle pull-off area for wildlife viewing.		✓
Design and install a small parking area on the east side of Endicott Road.		✓
Install a short trail to a viewing deck with views of the Black River and associated habitats at the parking area on the east side of Endicott Road. Interpretive panels would enhance the visitors experience and knowledge of the area's natural resources.		✓
Develop an interagency agreement or similar instrument with WDNR to allow cooperative management of public uses of the Black River channel.		✓
Upon establishment of the planned Thurston County Gate-Bellmore Trail, which would run along the eastern edge of the Unit, explore potential spur trails into the Unit to provide wildlife viewing opportunities.		✓
Explore opportunity for a cooperative agreement with Thurston County to facilitate improvements on the county right of way at 123 <sup>rd</sup> Avenue including a boat launch, small parking area, and new kiosk and interpretive signs on the southeastern side of bridge.		✓
Look for opportunities to partner with business, agencies, and organizations that are providing environmental education to local students.		✓

**Rationale:**

Compatible wildlife observation, photography, interpretation, and environmental programs receive priority consideration in planning and management on national wildlife refuges, secondary to the needs of fish and wildlife. Wildlife observation is the primary visitor activity at the Black River Unit. Wildlife observation and photography programs are designed to provide a diversity of high-quality viewing opportunities for visitors while minimizing disturbance to wildlife and habitats. These activities increase public understanding and appreciation for America's natural resources and incorporate a message of stewardship and conservation.

The Unit allows bird watching, wildlife observation, and recreational opportunities in habitats unique to the local area. The native habitats at the Unit, such as the river corridor and the associated uplands and wetlands, are most easily experienced by boat. Currently, the only place available for public boat launching is an undeveloped Thurston County right-of-way at 123<sup>rd</sup> Avenue. By making

improvements to this county land and adding a small parking area in the Unit-owned uplands adjacent to the ROW, visitors would have an improved place to launch boats.

A small vehicle pull-off area and interpretive information are proposed to bring vehicles off Endicott Road to view wildlife and increase visitor safety. Trail connections with Thurston County would enhance both the County’s trail system and provide an avenue for Unit visitors to experience the habitats closely associated with the river. The Unit would be open to the public from sunrise to sunset. Areas not specifically open would be closed to protect wildlife and habitat from disturbance.

***Goal 6. Support and develop an active volunteer program and partnerships to assist in providing quality visitor services programs and outreach.***

**Black River Unit Objective: 6.1 Develop and promote a Unit volunteer program**

Develop, support, and maintain a volunteer program associated with the Unit with the following attributes:

- Provide effective training and program management
- Support and complement the Service mission and current initiatives
- Increase visibility and foster conservation
- Support a variety of Unit programs/activities and increase their effectiveness
- Encourage community involvement and strengthen relationships

Strategies Applied to Achieve Objective:	Alt 1	Alt 2
Identify areas where volunteers could work in support of Unit programs and management objectives.		✓
Publicize volunteer opportunities to recruit new volunteers from the local community.		✓
Look for ways to partner with other organizations to provide volunteers.		✓
Maintain an up-to-date “Volunteer Training Manual.”		✓
Provide a training course for volunteers on the Service, Billy Frank Jr. Nisqually National Wildlife Refuge and the Black River Unit history, management, and natural resources; the specifics of the Unit volunteer program and volunteer opportunities; and the specifics of volunteer duties.		✓
Recruit and train volunteers who would work with a variety of Unit programs.		✓
Recruit and train volunteers from the Nisqually National Wildlife Refuge Complex to help with a variety of Unit activities.		✓
Provide volunteers with annual recognition.		✓

**Rationale:**

Volunteers provide a very important and needed service on national wildlife refuges. Successful volunteer programs are recognized as a key component of the successful management of public lands and are vital to implementation of refuge programs, plans, and projects, especially in times of declining budgets.

Unit volunteers would be recruited from the local area as well as from the Nisqually National Wildlife Refuge Complex volunteer program. New volunteers would participate in the volunteer training course provided at Nisqually National Wildlife Refuge and be given the necessary information to perform the required tasks. Volunteer projects could include: 1) weed warriors who help to identify and control invasive plants; 2) wildlife surveys and monitoring; and 3) education and outreach.

Volunteers would play an important role as the Unit continues to acquire lands, increase habitat enhancement and management programs, and assist with visitor services programs to the public. In addition to providing assistance with programs and helping the Unit meet its mission, volunteers are outreach ambassadors in the community. They spread the word message about the Unit throughout the community where they live.

**Black River Unit Objective: 6.2 Support and encourage partnerships to support visitor services programs**

Support and encourage partnerships with the following attributes:

- Partners support the mission of the Unit and Refuge System
- Working together with Unit staff, partners would be advocates for the Unit in helping secure resources and funding for programs and facilities
- Partners would provide needed volunteer support to Unit programs
- Partners may be a part of a network of Friends Groups across the county supporting and advocating for the National Wildlife Refuge System

<b>Strategies Applied to Achieve Objective:</b>	<b>Alt 1</b>	<b>Alt 2</b>
Identify local community groups, businesses, and organizations that could help support the Unit’s visitor services program and facilities development.		✓
Work with local partners to develop public programs.		✓
Explore ways to work with the Chehalis Basin Partnership and other partners to provide education and outreach to local communities.		✓

**Rationale:**

National wildlife refuges have developed extensive and sophisticated partnerships and Friends Groups in order to carry out the mission of the Refuge System. Partners provide support in a variety of ways at the local, regional, and national levels. Partnerships and Friends Groups provide a way for citizens to be involved in and work to enhance and improve the resources that refuges are mandated to protect.

As the Unit continues to acquire land, improve and enlarge habitat management programs, and open areas and activities to the public, the need for partner support of the visitor services programs would grow. Partners could provide financial or technical support as well as on-the-ground program support. These invaluable contributions by partners would play an important role in the success and growth of the Unit's visitor services programs.

Support at the local level would be important for the development of visitor facilities and programs. Working with a variety of partners would enable the Unit to reach new audiences and to stay active and visible in the local community.

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