Dungeness National Wildlife Refuge

Draft Environmental Assessment for Quarters Replacement

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January 12, 2016

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Chapter 1. Introduction and Background

1.1 Introduction

Dungeness National Wildlife Refuge (NWR or Refuge) is managed by the U.S. Fish and Wildlife Service (USFWS or Service) as part of the National Wildlife Refuge System (Refuge System). The Washington Maritime National Wildlife Refuge Complex (Complex) comprises six individual National Wildlife Refuges that are located on the coast of Washington and within the Salish Sea (Figures 1-1 and 1-2). The Complex supports a rich diversity of wildlife habitats including coastal rocks, reefs, and islands; forested and grass-covered islands; tidelands; salt and freshwater marshes; barrier and pocket beaches; and riparian areas. The six National Wildlife Refuges include Copalis, Quillayute Needles, Flattery Rocks, Dungeness, Protection Island, and San Juan Islands.

Dungeness NWR consists of the Dungeness Unit, which includes the Graveyard Spit Research Natural Area (RNA), and the Dawley Unit (Figure 1-3). Both these units are within the geographic area known as the Salish Sea (Figure 1-1). The Salish Sea is a single estuarine ecosystem that extends from the north end of the Strait of Georgia to the west end of the Strait of Juan de Fuca and south to the southern extent of Puget Sound. It encompasses the inland marine waters of southern British Columbia, Canada, and northern Washington, USA.

The Dungeness Unit was established to protect and preserve breeding grounds for native birds in 1915. Originally the Unit was part of a lighthouse reservation, on which the New Dungeness Lighthouse was built in 1857. For the most part, the coastal strand and spit, coastal lagoon, salt marsh, and mudflat habitats associated with the Dungeness and Graveyard Spits were not altered by humans, with the exception of the years of 1940-1955, during which time the Navy maintained a small presence for radio communications on Graveyard Spit. Upland habitats at the base of Dungeness Spit, including forests and sandy bluffs, were added with subsequent acquisitions.

The Mellus property and Mellus Cabin were acquired in the early 1970s. The cabin was most likely built sometime in the early 1950s and is located along the Refuges main public access trail. The cabin served as quarters for a full-time volunteer refuge caretaker until recently.

1.2 Significance of the Refuge

Dungeness Spit is the longest sand spit in North America. Extending five miles into the Strait of Juan de Fuca, it provides habitat for a great variety of migratory shorebirds, waterfowl, marine mammals, and marine life. The tranquil waters of Dungeness Bay, with its eelgrass beds, mudflats, and tidelands provide food, shelter, and breeding grounds to support a whole ecosystem teeming with life. Large numbers of brant, wigeon, pintail, mallard, and bufflehead spend their winters here. Surf smelt, herring, Pacific sand lance and other species of marine fish breed and rear within the bay. Anadromous fish such as chinook, chum, pink, coho salmon and steelhead and cutthroat trout are dependent on nearshore habitats within Dungeness Bay and Harbor during the juvenile rearing period. The bay also serves as a vital nursery area for commercially important species such as marine invertebrates (e.g., Dungeness crab) which seek these areas for refugia. The rare northern elephant seal hauls out on the spit each year. Graveyard Spit supports some of the best remaining coastal strand habitat within the Salish Sea.

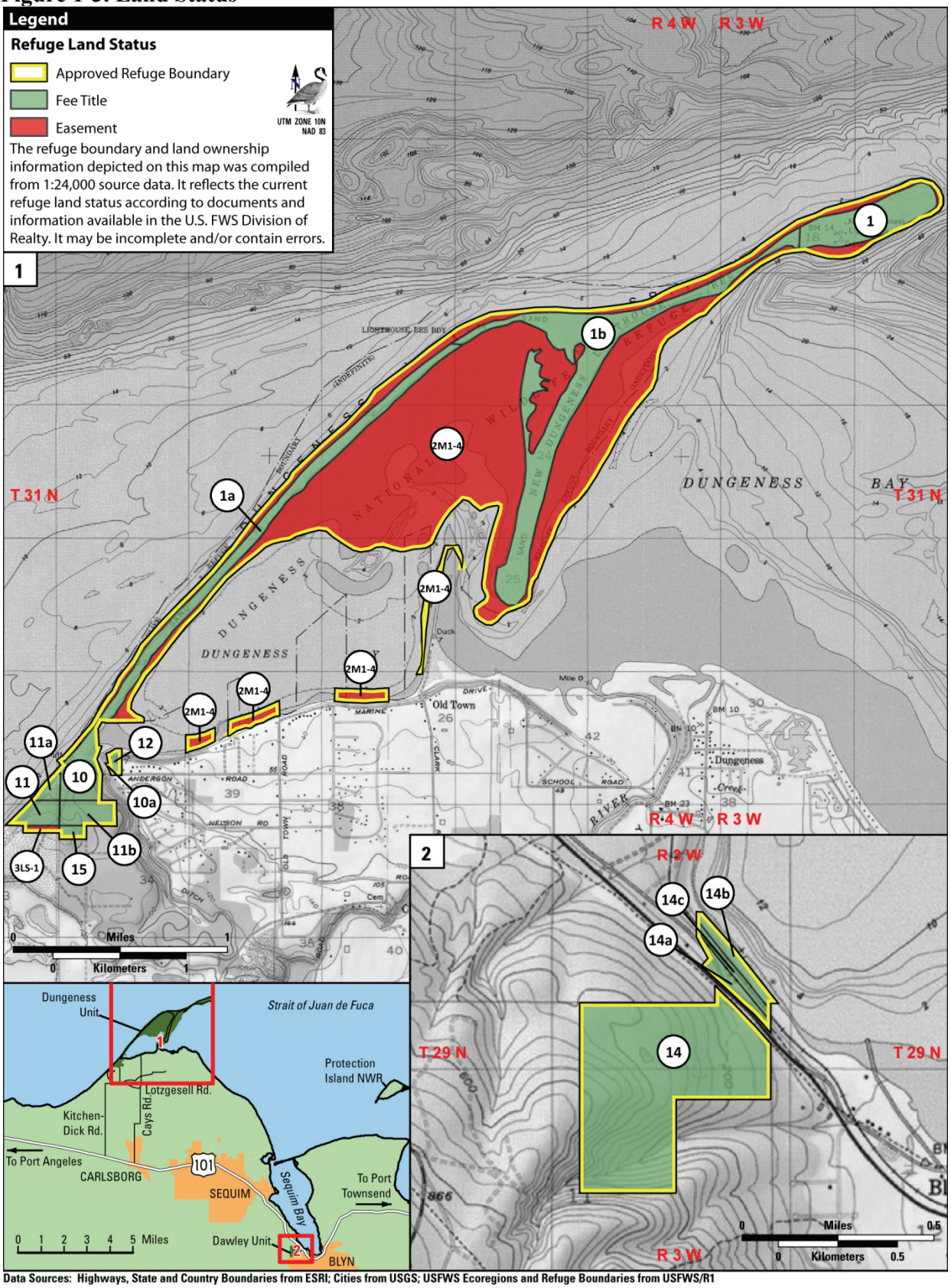
Figure 1-1. Salish Sea

Data Sources: Populated Places and Country Boundaries from Natural Earth; Imagery from NASA Blue Marble; Elevation from NASA/CGIAR-CSI

Figure 1-2. Regional Context

Data Sources: Highways, State and Country Boundaries from ESRI; Cities from USGS; USFWS Ecoregions and Refuge Boundaries from USFWS/R1

Figure 1-3. Land Status



Data Sources: Highways, State and Country Boundaries from ESRI; Cities from USGS; USFWS Ecoregions and Refuge Boundaries from USFWS/R1

1.3 Purpose and Need for Action

The Service is in need of housing for volunteers, interns, and/or staff at Dungeness National Wildlife Refuge. The housing that is currently being used is in disrepair and needs to be replaced and has been identified for demolition since 2006. The purpose of this Environmental Assessment is to develop and examine alternatives for replacement quarters that provide a safe living environment while minimizing impacts to Refuge wildlife, habitats and visitors.

1.4 Legal and Policy Guidance

1.4.1 The U.S. Fish and Wildlife Service

All refuges are managed by the Service, an agency within the Department of the Interior. The Service is the principal Federal agency responsible for conserving, protecting, and enhancing the Nation's fish and wildlife populations and their habitats.

The mission of the Service is "working with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people." Although we share this responsibility with other Federal, state, tribal, local, and private entities, the Service has specific trust responsibilities for migratory birds, endangered and threatened species, and certain anadromous fish and marine mammals. The Service has similar trust responsibilities for the lands and waters we administer to support the conservation and enhancement of fish, wildlife, plants, and their habitats. The Service also enforces Federal wildlife laws and international treaties for importing and exporting wildlife, assists with state fish and wildlife programs, and helps other countries develop wildlife conservation programs.

1.4.2 National Wildlife Refuge System

A refuge is managed as part of the National Wildlife Refuge System within a framework provided by legal and policy guidelines. The Refuge System is the world's largest network of public lands and waters set aside specifically for conserving wildlife and protecting ecosystems.

The needs of wildlife and their habitats come first on refuges, in contrast to other public lands that are managed for multiple uses. Refuges are guided by various Federal laws and executive orders, Service policies, and international treaties. Fundamental are the mission and goals of the Refuge System and the designated purposes of the refuge unit as described in establishing legislation, executive orders, or other documents establishing, authorizing, or expanding a refuge.

National Wildlife Refuge System Mission and Goals
The mission of the Refuge System is "*to administer a national network of lands and waters for the conservation, management, and where appropriate, restoration of the fish, wildlife, and plant resources and their habitats within the United States for the benefit of present and future generations of Americans*" [National Wildlife Refuge System Administration Act of 1966, as amended (16 U.S.C. 668dd et seq.)]

The goals of the Refuge System, as articulated in the Mission Goals and Purposes policy (601 FW 1) are:

- Conserve a diversity of fish, wildlife, and plants and their habitats, including species that are endangered or threatened with becoming endangered.
- Develop and maintain a network of habitats for migratory birds, anadromous and inter-jurisdictional fish, and marine mammal populations that is strategically distributed and carefully managed to meet important life history needs of these species across their ranges.
- Conserve those ecosystems, plant communities, wetlands of national or international significance, and landscapes and seascapes that are unique, rare, declining, or underrepresented in existing protection efforts.
- Provide and enhance opportunities to participate in compatible wildlife-dependent recreation (hunting, fishing, wildlife observation and photography, and environmental education and interpretation).
- Foster understanding and instill appreciation of the diversity and interconnectedness of fish, wildlife, and plants and their habitats.

Law and Policy Pertaining to the Refuge System

Refuges are guided by various Federal laws and executive orders, Service policies, and international treaties. Fundamental to the management of every refuge are the mission and goals of the Refuge System and the designated purposes of the refuge unit as described in establishing legislation, executive orders, or other documents establishing, authorizing, or expanding a refuge.

Key concepts and guidance of the Refuge System derive from the National Wildlife Refuge System Administration Act of 1966 (Administration Act) as amended (16 U.S.C. 668dd-668ee); the Refuge Recreation Act of 1962 as amended (16 U.S.C. 460k-460k-4); Title 50 of the Code of Federal Regulations; and the Service Manual. The Administration Act is implemented through regulations covering the Refuge System, published in Title 50, subchapter C of the Code of Federal Regulations and policies contained in the Service Manual. These regulations and policies govern general administration of units of the Refuge System.

Many other laws apply to the USFWS and management of Refuge System lands. Examples include the Endangered Species Act of 1973 (ESA), as amended, and the National Historic Preservation Act of 1966, as amended. Brief descriptions of laws pertinent to Dungeness National Wildlife Refuge are included in this chapter. A complete list of laws pertaining to the USFWS and the Refuge System can be found at http://laws.fws.gov.

Refuge Recreation Act of 1962 (16 U.S.C. 460k-460k-4). The Refuge Recreation Act authorized the Secretary of the Interior to administer refuges, hatcheries, and other conservation areas for recreational use, when such uses do not interfere with the area's primary purposes. It provided for public use fees and permits, and penalties for violating regulations. It also authorized the acceptance of donated funds and real and personal property, to assist in carrying out its purposes. Enforcement provisions were amended in 1978 and 1984 to make violations misdemeanors in accordance with the uniform sentencing provisions of 18 U.S.C. 3551-3586.

National Wildlife Refuge System Administration Act (16 U.S.C. 668dd et seq.) as amended by the National Wildlife Refuge System Improvement Act (Public Law 105-57). Of all the laws governing activities on national wildlife refuges, the Refuge Administration Act exerts the greatest influence. The National Wildlife Refuge System Improvement Act of 1997 (Refuge Improvement Act) amended the Administration Act by defining a unifying mission for all refuges, including a new

process for determining compatible uses on refuges, and requiring that each refuge be managed under a comprehensive conservation plan. Key provisions of the Refuge Administration Act follow.

- Comprehensive conservation planning. A CCP must be completed for each refuge by the year 2012, as is required by the Refuge Administration Act. Each CCP will be revised every 15 years or earlier if monitoring and evaluation determine that changes are needed to achieve the refuge's purposes, vision, goals, or objectives. The Refuge Administration Act also requires that CCPs be developed with the participation of the public. Public comments, issues, and concerns are considered during the development of a CCP, and together, with the formal guidance, can play a role in selecting the preferred alternative. Information on public involvement can be found in Appendix K. The CCP provides guidance in the form of goals, objectives, and strategies for refuge programs, but may lack some of the specifics needed for implementation. Therefore, step-down management plans will be developed for individual program areas as needed, following completion of the CCP. The step-down plans are founded on management goals, objectives and strategies outlined in a CCP, and require appropriate NEPA compliance.

- Wildlife conservation; biological diversity, integrity and environmental health. The Refuge Administration Act expressly states that the conservation of fish, wildlife and plants, and their habitats is the priority of Refuge System lands, and that the Secretary of the Interior shall ensure that the biological integrity, diversity, and environmental health of refuge lands are maintained. House Report 105–106 accompanying the Improvement Act states "… the fundamental mission of our System is wildlife conservation: wildlife and wildlife conservation must come first."

- Refuge purposes. Each refuge must be managed to fulfill the Refuge System mission and the specific purpose(s) for which the refuge was established. The purposes of a refuge are specified in or derived from the law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, refuge unit, or refuge subunit. When a conflict exists between the Refuge System mission and the purpose of an individual refuge, the refuge purpose may supersede the mission.

- Priority public uses on refuges. The Administration Act superseded some key provisions of the Refuge Recreation Act regarding compatibility, and also provided significant additional guidance regarding recreational and other public uses on units of the Refuge System. The Refuge Administration Act identifies six priority wildlife-dependent recreational uses. These uses are hunting, fishing, wildlife observation and photography, and environmental education and interpretation. The Service is to grant these six wildlife-dependent public uses special consideration during planning for, management of, and establishment and expansion of units of the Refuge System. When determined compatible on a refuge-specific basis, these six uses assume priority status among all uses of the refuge in question. The Service is to make extra efforts to facilitate priority wildlife-dependent public use opportunities.

Compatibility and Appropriate Refuge Uses Policies (603 FW 2 and 1). With few exceptions, lands and waters within the Refuge System are different from multiple-use public lands in that they are closed to all public access and use unless specifically and legally opened. No refuge use may be allowed or continued unless it is determined to be appropriate and compatible. Generally, an

appropriate use is one that contributes to fulfilling the refuge purpose(s), the Refuge System mission, or goals or objectives described in a refuge management plan. A compatible use is a use that in the sound professional judgment of the refuge manager will not materially interfere with or detract from the fulfillment of the mission of the Refuge System or the purposes of the refuge.

The six wildlife-dependent recreational uses described in the Refuge Administration Act (hunting, fishing, wildlife observation and photography, and environmental education and interpretation) are defined as appropriate. When determined to be compatible, they receive priority consideration over other public uses in planning and management. Other non-wildlife-dependent uses on a refuge are reviewed by the refuge manager to determine if the uses are appropriate. If a use is determined appropriate, then a compatibility determination is completed.

Biological Integrity, Diversity, and Environmental Health (BIDEH) Policy (601 FW 3). The Refuge Administration Act directs the Service to "ensure that the biological integrity, diversity, and environmental health of the National Wildlife Refuge System are maintained for the benefit of present and future generations of Americans..." The policy is an additional directive for refuge managers to follow while achieving refuge purpose(s) and the Refuge System mission. It provides for the consideration and protection of a broad spectrum of native fish, wildlife, and habitat resources found on refuges and associated ecosystems. When evaluating the appropriate management direction for refuges (e.g., in compatibility determinations), refuge managers will use sound professional judgment to determine their refuge's contribution to biological integrity, diversity, and environmental health at multiple landscape scales. Sound professional judgment incorporates field experience, knowledge of refuge resources, an understanding of the refuge's role within an 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."

Wildlife-dependent Recreation Policies (605 FW 1-7). The Refuge Administration Act states that "compatible wildlife-dependent recreation is a legitimate and appropriate general public use of the System." A series of recreation policies provide additional guidance and requirements to consider after a recreational use has been determined to be compatible. These policies also establish a quality standard for visitor services on national wildlife refuges. Through these policies, we are to simultaneously enhance wildlife-dependent recreational opportunities, provide access to quality visitor experiences, and manage refuge resources to conserve fish, wildlife, plants, and their habitats. New and ongoing recreational uses should help visitors focus on wildlife and other natural resources, and provide an opportunity to display resource issues, management plans, and how the refuge contributes to the Refuge System and the Service's mission. The policies also require development of a visitor services plan.

1.4.3 Other Laws and Mandates

Many other Federal laws, executive orders, Service policies, and international treaties govern the Service and Refuge System lands. In 2013 a Comprehensive Conservation Plan was completed for Dungeness National Wildlife Refuge, ensuring that future management of all Refuge programs would meet these legal requirements. Chapter 5 of the approved plan stated that the Mellus Cabin was slated for demolition, but does not discuss placement of a new facility.

1.5 Refuge Establishment and Purposes

1.5.1 Legal Significance of the Refuge Purpose

The purpose for which a refuge was established or acquired is of key importance in refuge planning. Purposes must form the foundation for management decisions. The refuge purposes are critical to determining the compatibility of existing and planned refuge uses.

The purposes of a refuge are specified in or derived from the law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, refuge unit, or refuge subunit.

1.5.2 Purpose and History of Refuge Establishment

Background
Establishment authorities, acquisition history, refuge purposes, and land status for Dungeness Unit of Dungeness NWR are all included here because their research and documentation are intertwined. The Service's Land Record System was reviewed for Dungeness NWR. Realty hardcopy files, Federal Register Archive, county records, Service's Lands Mapper program, and station files were searched in documenting these findings.

Refuge Purposes Statement (*purposes are bold and italicized*)

Dungeness National Wildlife Refuge (NWR) was established by Executive Order (E.O.) 2123 on January 20, 1915 for the land to be ***"…as a refuge, preserve and breeding ground for native birds."*** The original 226.02 acres were known as the Dungeness Spit Reservation. This purpose applies to all portions of Dungeness NWR.

Most of the additional tracts acquired between the years 1972-1999, for a total of 39 acres, that make up the Refuge were authorized by the same Public Law and purchased with funds authorized by the Fish and Wildlife Act of 1956 (FWA) (16 U.S.C. 742a-742j), as amended. This Act authorized the ***"****… **acquisition of refuge lands for the development, advancement, management, conservation, and protection of fish and wildlife resources ..."*** 16 U.S.C. 742f(a)(4)) "***... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude ..."*** 16 U.S.C. § 742f(b)(1) and Section 7(a)(1) of the Land and Water Conservation Fund Act (16 U.S.C. 4601-9) provides authority to use Land and Water Conservation Fund (LWCF) monies for acquisition under this Act. Purposes of the Land and Water Conservation Fund Act of 1965, as amended, include acquisition of **"(d) any areas authorized for the National Wildlife Refuge System by specific Acts (16 U.S.C. 460l-9)."**

Additional land was purchased from willing sellers, received through donations, or easements. One purchase in 1971, for 45 acres, was acquired under the Refuge Recreation Act of 1962 as amended (16 U.S.C. §460k-460k-4) -- Public Law 87-714, ***"…suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered or threatened species…"*** (16 U.S.C. 460 k-1) and ***"... the Secretary ... may accept and use ... real ... property. Such acceptance may be accomplished under the terms and conditions of***

restrictive covenants imposed by donors ...” (16 U.S.C. § 460k-2). There were two authorities that the donation was made under; the first was the Endangered Species Act of 1973 (16 U.S.C. §1543) as amended of 3.66 acres, “***... to conserve (A) fish or wildlife which are listed as endangered species or threatened species .... or (B) plants ...”*** The second was under the Fish and Wildlife Act of 1956 for 125 acres.

1.5.3 Land Status and Ownership

The Dungeness National Wildlife Refuge was established by January 20, 1915 by President Woodrow Wilson. Consisting originally of 226.02 acres of barrier beach as an overlay with secondary jurisdiction to lighthouse and military purposes it was known then as the Dungeness Spit Reservation. In 1923, E.O. 3893 gave USFWS primary withdrawal on Tract 1a because the military reservation was removed and there was no lighthouse reservation on that tract (Figure 1-3). On July 25, 1940, Presidential Proclamation 2416 changed the name from Dungeness Spit Reservation to Dungeness National Wildlife Refuge.

Additional land was acquired from willing sellers, donations, or easements. The Refuge received a permanent easement to 321 acres of second class tidelands within the northern portion of Dungeness Bay from the State of Washington in 1943. The first purchase was for 45 acres from Mr. and Mrs. Haugland. This consisted of the forested section and bluffs to the west of the base of the spit. The next was the purchase of 29 acres from Mr. Mellus. These two sales, which now included additional forest and a cabin, actually connected the Refuge to the mainland for the first time.

The current refuge administrative site, which is situated on 5.04 acres, was purchased from Mr. and Mrs. Krier on Nov. 20, 1996. This purchase also provided a buffer for the Refuge. The Nature Conservancy of Washington assisted the Service in the purchase of the Weinstein Tract, consisting of 4.56 acres of coastal forest, on May 19, 1999. This tract protected the viewshed to the east from the observation platforms along the main trail.

1.6 Relationship to Other Planning Efforts

1.6.1 Refuge Planning

Comprehensive Conservation Plans (CCP) have been developed for each Refuge in the Washington Maritime NWRC, and provide 15-year plan for management of Refuge programs. The Comprehensive Conservation Plan for Dungeness National Wildlife Refuge was completed and approved in 2013. Additional information on laws and regulations related to Refuge management, establishment and land status history, the human environment and biological environments of the Refuge, and the future of Refuge programs can be found in the CCP. This planning effort is stepped down from that CCP and will support the goals and objectives identified in the selected alternative.

1.6.2 Additional Plans

The Clallam County Shoreline Master Program (SMP) is a comprehensive use plan for shoreline areas that includes goals and policies consistent with state law; use and development regulations; and administrative procedures for the shoreline permitting process. Because the CCP did not address

relocation of Refuge facilities, buffers identified in the Clallam County SMP were addressed. Since one of the goals of the Shoreline Master Program is to protect shoreline natural resources and functions, this planning effort will attempt to use its shoreline buffers as minimum setbacks for all new construction and in determining the fate of the Mellus Cabin and its associated structures.

Chapter 2. **Alternatives**

The National Environmental Policy Act (NEPA) requires Federal agencies to evaluate a full range of reasonable alternatives to a proposed action. This chapter describes the alternatives development process and three possible alternatives for management of Dungeness National Wildlife Refuge.

2.1 Alternatives Descriptions

2.1.1 Construction Alternatives Considered but Not Developed

Construction of new quarters at the site of the current Mellus Cabin was considered but not developed for the following reasons:

- Access to the site is narrow and winding and would increase costs associated with building by requiring more expensive construction or delivery methods (e.g., delivery by helicopter or stick built construction)
- Access to the site is on a publicly used foot trail that is used by 80,000 – 100,000 visitors/year. Construction at the current cabin location could precipitate closure of the trail during the construction window and impede use of the Refuge by visitors.
- The Draft Clallam County Shoreline Master Program calls for new development to be 225ft landward of the bluff edge, which would exclude this building site.
- Pumping well water into an onsite septic system on the bluff increases erosion and instability of the bluff.

2.1.2 Features Common to All Alternatives

All alternatives contain some common features. These are presented below to reduce the length and redundancy of the individual alternative descriptions.

Climate change. As stated in the Department of the Interior'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. Habitat conditions and wildlife populations are directly and indirectly sensitive to climatic conditions, namely precipitation and temperature and changes to hydrologic conditions, sea level rise and ocean acidification.

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

The refuge will participate in and contribute to climate change assessment efforts, including those underway at a landscape scale, such as the North Pacific Landscape Conservation Cooperative (LCC). LCCs are 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. Knowledge and monitoring of

regional and local climate trends on refuge resources will be used to assess potential changes or enhancements to the Refuge's management actions and techniques and/or their timing, using the adaptive management approach described above. The refuge will also continue to take steps to mitigate effects of climate change, and reduce its carbon footprint to help achieve the Service's national commitment to become carbon-neutral by 2020 (USFWS 2010). Consistent with available funding, the refuge will replace its current vehicles with more fuel-efficient vehicles; explore the feasibility of photo-voltaic panels; build appropriately sized, energy-efficient facilities; use energy-efficient techniques for land management; and explore ways of offsetting any remaining carbon balance through means such as carbon sequestration.

Implementation subject to funding availability. Replacement and demolition of the Mellus Cabin will only occur as funding is available.

Accessibility of facilities. Regardless of the alternative selected, the replacement quarters will be built in compliance with the Architectural Barriers Act of 1968 and the Americans with Disabilities Act of 1990.

Paleontological and cultural resources protection. The possibility of finding paleontological resources on the Refuge is considered high. The collection and curation of paleontological resources will be managed under the Department of the Interior's Museum Property program and the Paleontological Resources Preservation Act (PRPA) of 2009. The Service will continue to uphold Federal laws protecting cultural resources, including the National Historic Preservation Act (NHPA), Archaeological Resources Protection Act (ARPA), and Native American Graves Protection and Repatriation Act (NAGPRA). These laws also mandate consultation with Native American tribes, the State Historic Preservation Office (SHPO), and other preservation partners.

The NHPA mandates that all projects that use federal funding, permitting, or licensing be reviewed by a cultural resource professional to determine if there is the potential to affect cultural resources. National Register of Historic Places eligibility was reviewed and it was determined that the Mellus Cabin does not meet the eligibility criteria (See Chapter 5). A Request for Cultural Resources Compliance was requested for the demolition of the Mellus Cabin and the site selected as the preferred alternative. The project will be altered as necessary to comply with cultural resource laws, policies and regulations.

Regulatory compliance. Prior to implementation, all activities in all alternatives will undergo appropriate reviews and consultations, and permits and clearances will be secured, as necessary, to comply with legal and policy requirements.

2.1.3 Summary of Alternatives

A brief description of each alternative follows. A map (Figure 2-1) showing approximate locations of the alternative construction sites, follows the alternatives descriptions.

Alternative A: No Action Alternative (Current Management)
Under Alternative A, the Refuge would continue to house volunteers, interns, and/or staff in the Mellus Cabin and all associated structures (e.g., septic, well, garage) at its current location. The cabin is currently located adjacent to the upland forest trail approximately 700 feet up the trail from

the toe of the spit. It is approximately 340 feet from the bluff overlooking the Strait of Juan de Fuca and 100 feet from the edge of the bluff overlooking the spit. The cabin would not be used as quarters unless additional repairs were completed to remove and restrict re-entry by rodents and re-roof the structure.

Alternative B: Partial Demolition and Replacement at HQ (Preferred Alternative)
The Mellus Cabin and attached volunteer office would be demolished and the associated septic system would be decommissioned. The well, electricity and ATV garage would remain on site. The site and adjacent grassy field would be partially rehabilitated. The well is important to the upkeep of Refuge equipment, especially ATV and UTVs. If salt water is not rinsed from the vehicles before storage, corrosion can occur reducing the lifespan of the vehicle. The ability to store ATV and UTVs at the Mellus Cabin site allows for quick response to issues arising on the spit. It also reduces to disturbance to Refuge visitors and wildlife along the upper portion of the main trail.

New refuge quarters would be established to the east of the Refuge vehicle garage/motor pool in the current refuge administrative area (i.e., site purchased from Krier on Nov. 20, 1996). The quarters would consist of 1-2 small houses (see Appendix A for an example) and space for parking (potentially under a carport). The quarters would utilize the existing septic tank and drain field and be connected to existing electrical services near the headquarters office. The quarters would also be connected to the existing water service supplied by Estates Water.

We anticipate this alternative will cost the least of all alternatives because it requires less demolition than alternatives C and E, no clearing of wooded areas (as opposed to D & E), the ability to tie into existing septic and electrical utilities, and it will require less staff time to provide safety and traffic control for visitors during construction of new facilities than alternatives D & E.

Because of this alternative has more positive and less negative impacts to visitors, habitat and wildlife than alternatives D & E, will cost less than all other action alternatives, and allows the Refuge to maintain critical facilities that would be lost in alternatives C and E, it has been selected as the preferred alternative.

Alternative C: Full Demolition and Replacement at HQ
All structures and associated utilities at the Mellus Cabin site would be removed and or decommissioned including the garage, volunteer office, Mellus Cabin, well, septic, and electricity. The entire site and adjacent grassy field would be re-forested. Under this alternative, the Refuge would lose facilities that are important to visitor safety and equipment upkeep.

New refuge quarters would be established to the east of the Refuge vehicle garage/motor pool in the current refuge administrative area (i.e., site purchased from Krier on Nov. 20, 1996). The quarters would consist of 1-2 small houses (see Appendix A for an example) and space for parking. The quarters would utilize the existing septic tank and drain field and be connected to existing electrical services near the headquarters office. The quarters would also be connected to the existing water service supplied by Estates Water.

This alternative will cost less than alternatives D & E there is no clearing of wooded areas, the new facility will tie into existing septic and electrical utilities, and it will require less staff time to provide safety and traffic control for visitors during construction of new facilities than alternatives D & E.

However, the cost of this alternative will be greater than alternative B because it requires full demolition and removal of all facilities and utilities at the Mellus Cabin site.

Alternative D: Partial Demolition and Replacement in Woods

The Mellus Cabin and attached volunteer office would be demolished and the associated septic system would be decommissioned. The well, electricity and ATV garage would remain on site. The site and adjacent grassy field would be partially rehabilitated. The well is important to the upkeep of Refuge equipment, especially ATV and UTVs. If salt water is not rinsed from the vehicles before storage, corrosion can occur reducing the lifespan of the vehicle. The ability to store ATV and UTVs at the Mellus Cabin site allows for quick response to issues arising on the spit. It also reduces to disturbance to Refuge visitors and wildlife along the upper portion of the main trail.

New refuge quarters would be established in the wooded area to the northeast of the Refuge Entrance. The quarters would consist of 1-2 small houses (see Appendix A for an example). Tenants would park in the visitor parking area. A new septic and drain field would need to be cleared and constructed and electrical service would need to be run from the Refuge office to the new site. The distance to active electrical services is greater under this alternative than it is in B & C. The quarters would be connected to the existing water service supplied by Estates Water.

We anticipate this alternative will cost more than alternatives B & C due to the need to clear wooded areas for placement of the new quarters, construction of septic facilities and providing electrical service. Construction activities near the entrance to the Refuge will also create a longer term impact to Refuge visitors and increase staff time needed to provide traffic control and safe visitor egress around the site. Alternative D has more negative and less positive effects than Alternatives B & C.

Alternative E: Full Demolition and Replacement in Woods

All structures and associated utilities at the Mellus Cabin site would be removed and or decommissioned including the garage, volunteer office, Mellus Cabin, well, septic, and electricity. The entire site and adjacent grassy field would be re-forested. Under this alternative, the Refuge would lose facilities that are important to visitor safety and equipment upkeep.

New refuge quarters would be established in the wooded area to the northeast of the Refuge Entrance. The quarters would consist of 1-2 small houses (see Appendix A for an example). Tenants would park in the visitor parking area. A new septic and drain field would need to be cleared and constructed and electrical service would need to be run from the Refuge office to the new site. The distance to active electrical services is greater under this alternative than it is in B & C. The quarters would be connected to the existing water service supplied by Estates Water.

We anticipate this alternative will be the most expensive alternative due to the need to clear wooded areas for placement of the new quarters, construction of septic facilities and providing electrical service. Construction activities near the entrance to the Refuge will also create a longer term impact to Refuge visitors and increase staff time needed to provide traffic control and safe visitor egress around the site. In addition this alternative requires full demolition of all structures and utilities at the Mellus Cabin site which will add increased cost to the project. Alternative D has more negative and less positive effects than Alternatives B & C.

Table 2-1. Summary of Alternatives

	Alternative A (Current Management)	Alternative B (Preferred Alternative)	Alternative C	Alternative D	Alternative E
Use of Structure	This structure would not be used in its current state	Refuge quarters (e.g., housing for volunteers, researchers and interns)	Same as Alternative B	Same as Alternative B	Same as Alternative B
Structures	All structures remain	Cabin and volunteer office would be demolished. Septic system would be decommissioned. Well, electricity and ATV garage would remain on site.	All structures and utilities removed or decommissioned	Same as Alternative B.	Same as Alternative C.
New Site	N/A	East of Vehicle Garage.	Same as Alternative B.	North of Refuge Entrance.	Same as Alternative D.
Site Rehabilitation	No rehabilitation	Rehabilitation of field adjacent to structures and area where structures are removed.	Rehabilitation of entire area.	Same as Alternative B.	Same as Alternative B.
Habitat Alteration	No habitat alteration	Minimal habitat alteration. No tree removal.	Same as Alternative B.	Trees would need to be removed within construction site. Approximately 4000 – 5000sqft.	Same as Alternative D.
Ability to respond to Issues Occurring on the Spit	No Change	No Change	Negatively impacted by removal of facilities	Same as Alternative B.	Same as Alternative C
Equipment Upkeep	No Change	No Change	Negatively impacted by removal of well	Same as Alternative B	Same as Alternative B
Cost	No Change	Least Expensive	More Expensive than B.	More Expensive than B & C.	Most Expensive

*See Table 6-1 for a summary of effects under each alternative

Figure 2-1. Alternative Site Locations

* Site depictions are approximations only. Location, size and shape may vary.

Chapter 3. Physical Environment

3.1 Climate

3.1.1 General Climate Conditions

The climate at Dungeness National Wildlife Refuge (NWR) is a mild, mid-latitude, west coast marine type. Because of the moderating influence of the Pacific Ocean, extremely high or low temperatures are rare. Summers are generally cool and dry while winters are mild but moist and cloudy with most of the precipitation falling between November and January (USDA 1987, WRCC 2011a). Annual precipitation in the region is low due to the rain shadow cast by the Olympic Mountains and the extension of the Coastal Range on Vancouver Island. Snowfall is rare or light. During the latter half of the summer and in the early fall, fog banks from over the ocean and the Strait of Juan de Fuca cause considerable fog and morning cloudiness (WRCC 2011a).

3.1.2 Air Temperatures

There is no climate/weather station established on Dungeness NWR; however, temperature data have been consistently collected since October 1980 at the Sequim 2 E station (number 457544) located approximately 7 miles east of the Refuge. The proximity of this station to the Refuge provides valuable regional data. Table 3-1 provides a summary of the period of record.

As a result of the ocean's proximity, winter minimum and summer maximum temperatures are moderated. On average, 91.7 days per year experience minimum temperatures at or below freezing while 0.1 days per year experience temperatures at or below 0°F (WRCC 2011b). The first occurrence of freezing temperatures is usually in October (WRCC 2011c). The date of the last freezing temperatures in the spring ranges from the latter half of April to the first half of May (WRCC 2011d). Also, it is only in the extreme occurrences that temperatures have been recorded to exceed 90°F (WRCC 2011b).

Table 3-1. Air Temperature Summary near Dungeness NWR (WRCC 2011b)

Temperatures (°F)	**Sequim 2 E Oct. 1980 – Dec. 2010**
Average Monthly Temperature – High	57.6
Average Monthly Temperature – Low	39.3
Monthly Mean Winter Temperature – High	47.0
Monthly Mean Winter Temperature – Low	31.2
Monthly Mean Summer Temperature – High	68.6
Monthly Mean Summer Temperature – Low	49.0
Daily Maximum Extreme – High	94
Daily Maximum Extreme – Low	63
Daily Minimum Extreme – High	39
Daily Minimum Extreme – Low	-3

Mote (2003) observed that the Pacific Northwest region experienced warming of approximately 1.5°F during the 20th century. Fu et al. (2010) found that in Washington State from 1952 to 2002,

annual mean air temperature increased 1.1°F (daily mean), 0.43°F (daily maximum), and 1.67°F (daily minimum), on average. For trends local to the Refuge we turn to the United States Historical Climatology Network (USHCN) which provides a high-quality data set of daily and monthly records of basic meteorological variables from 1,218 observing stations throughout the continental U.S. The data have been corrected to remove biases or heterogeneities from non-climatic effects such as urbanization or other landscape changes, station moves, and instrument and time of observation changes. The closest station is Port Angeles and trends are provided in Table 3-2 and Figure 3-3. The average yearly temperature change has increased 0.34°F over the past 30 years, and more striking are the seasonal trends which show warmer winters, summers, and falls than the yearly trends, and cooler spring.

Future Trends
Scientists use a variety of climate models, which include consideration of natural processes and variability, as well as various scenarios of potential levels and timing of GHG emissions, to evaluate the causes of changes already observed and to project future changes in temperature and other climate conditions (e.g., Meehl et al. 2007, Ganguly et al. 2009, Prinn et al. 2011). All combinations of models and emissions scenarios yield very similar projections of increases in the most common measure of climate change, average global surface temperature (commonly known as global warming), until about 2030. Although projections of the magnitude and rate of warming differ after about 2030, the overall trajectory of all the projections is one of increased global warming through the end of this century, even for the projections based on scenarios that assume that GHG emissions will stabilize or decline. Thus, there is strong scientific support for projections that warming will continue through the 21st century, and that the magnitude and rate of change will be influenced substantially by the extent of GHG emissions (IPCC 2007, Meehl et al. 2007, Ganguly et al. 2009, Prinn et al. 2011).

3.1.3 Precipitation

The prevailing wind direction across the Olympic Peninsula from the southwest means that storms frequently drop their moisture on the west side of the Olympic Mountains. Consequently, the relatively low precipitation at Dungeness NWR is the result of its location in the “rain shadow.” The rain shadow is an area that extends east from Port Angeles towards Everett and north into the San Juan Islands (Bach 2004).

The discussion below includes data from the climate station closest to Dungeness NWR, located in Sequim. An average of 8.12 inches, or roughly 50 percent of the annual precipitation, at this station occurs during late fall and winter in the months of November, December, January, and February. By comparison, the summer months of June, July, and August receive an average of 2.11 inches, a scant 13 percent of the annual precipitation. Additionally, the rate of rainfall within the rain shadow differs from other areas on the Olympic Peninsula. This area frequently receives drizzle or light rain while other localities are experiencing light to moderate rainfall (WRCC 2011a). On average, 5 days per year experience more than 0.50 inch of precipitation and 1 day greater than 1.00 inch (WRCC 2011e). Snow events are infrequent. However, snowfall increases with distance from water and rise in terrain.

Longer-term precipitation trends in the Pacific Northwest are more variable than temperature and vary with the period of record analyzed (Mote et al. 2005). The Pacific Northwest experiences wide precipitation variability based on geography and seasonal and year-to-year variability (Salathé et al.

2010). Looking at the period 1920 to 2000, total annual precipitation has increased almost everywhere in the region, though not in a uniform fashion. Most of that increase occurred during the first part of the record with decreases more recently (Mote et al. 2005).

Precipitation trends from the Port Angeles USHCN observation station shows the average yearly precipitation change has decreased more than 5% over the past 30 years, with more striking decreases in the winter and increases in the summer.

Future Trends
Observations of Pacific Northwest precipitation trends through the 20th century indicate a region-wide increase of 14% for the period 1930-1995. Sub-regional trends ranged from 13%-38% (Mote 2003). However, these trends are not statistically significant and depend on the time frame analyzed. Cool season precipitation variability, though, has increased (Hamlet and Lettenmaier 2007).

Using data derived from the statistical downscaling of 20 global climate models, projected changes in annual precipitation within the Pacific Northwest throughout the twenty-first century, averaged over all models, are small (+1% to +2%) though individual models produce changes of as much as -10% or +20% by the 2080s. Some models project an enhanced seasonal cycle with changes toward wetter autumns and winters and drier summers (Mote and Salathé 2010). However, even small changes in seasonal precipitation could have impacts on streamflow flooding, summer water demand, drought stress, and forest fire frequency. Additionally, researchers have consistently found that regional climate model simulations yield an increase in the measures of extreme precipitation. This finding suggests that extreme precipitation changes are more related to increased moisture availability in a warmer climate than to increases in climate-mean precipitation (Leung et al. 2004, Salathé et al. 2010). Salathé et al. (2010) project increased extreme precipitation events in the State of Washington, with stronger increases in the northwestern portion of the state. It is important to note that the one conclusion shared by researchers is that there is greater uncertainty in precipitation projections than that of temperature predictions and models (Leung and Qian 2003, CIG 2004, Salathé et al. 2010).

3.1.4 Wind

During the spring and summer, the semi-permanent low-pressure cell over the North Pacific Ocean becomes weak and moves north beyond the Aleutian Islands. Meanwhile, a high-pressure area spreads over the North Pacific Ocean. Air circulates in a clockwise direction around the high-pressure cell bringing prevailing westerly and northwesterly winds. This seasonal flow is comparatively dry, cool, and stable (WRCC 2011a).

In the fall and winter, the high-pressure cell weakens and moves southward while the Aleutian low-pressure cell intensifies and migrates southward as well. It reaches its maximum intensity in midwinter. Wind direction switches to primarily southwesterly or westerly prevailing winds. The air mass over the ocean is moist and near the temperature of the water. As it moves inland, it cools and condenses, bringing the beginning of the wet season (WRCC 2011a).

Wind data collected hourly from an automated station at the William R. Fairchild International Airport in Port Angeles, located 14.5 miles west of the Dungeness NWR, have been used to draw generalizations about wind activity in/on the Refuge. Average wind speeds have been calculated on hourly data collected from 1996 to 2006. The highest average wind speeds occurred during the

summer months of June and July. The calmest months were during the fall months of October and November.

The open waters of the Strait of Juan de Fuca periodically allow very strong winds to develop, particularly during mid-latitude cyclone events (Reed 1980). Wantz and Sinclair (1981) published estimates of extreme winds in the Northwest. They estimate that speeds within the vicinity of Dungeness NWR sustained for an average of one minute and recurring on average every two years are as high as 50 mph, while fifty-year events would produce winds of approximately 68 mph. Peak gusts would be about 32% higher.

As a rule, tornadoes are infrequent in Washington and generally small in the northwestern part of the United States. The National Climatic Data Center maintains a database that provides information on the incidence of tornadoes reported in each county in the United States. This database reports that 107 tornadoes were reported in Washington from 1950 to 2011. No tornadoes have ever been reported in Clallam County (NCDC 2011).

3.2 Hydrology

3.2.1 Refuge Hydrology

Groundwater is recharged primarily by precipitation, the Dungeness River and irrigation water. Flow is generally south to north, following the slope of the land with the exception of some confined aquifers where vertical movement up or down is attributed to an artesian effect.

The headwaters of the Dungeness River begin in the steep alpine watershed of Olympic National Park. The Dungeness River and its tributaries drain about 200 square miles (322 square kilometers) and contain over 546 miles (879 kilometers) of river (Thomas et al. 1999). The Dungeness River flows generally north for about 32 miles, crossing the broad alluvial fan of the Sequim-Dungeness peninsula and into Dungeness Bay.

Larger amounts of snow fall in the upper part of the Dungeness River drainage basin. This snow, along with glacier ice, is a major source of water to the Dungeness River system (BOR 2002). The river is a bimodal flow river, showing two peaks over the course of the year: a smaller peak associated with winter storm flows and a larger peak associated with snowmelt and runoff in the late spring and early summer (EDPU 2005). According to the Dungeness-Quilcene Water Resources Management Plan (Jamestown S'Klallam Tribe 1994), "there is relatively little storage in the upper watershed, so that current-year precipitation directly controls runoff… and the rain shadow location exacerbates the late-summer low flow." Where the river empties into Dungeness Bay, the river flow situation is even more complex due to irrigation diversion and hydraulic continuity between the river and the shallow aquifer (Simonds and Sinclair 2002).

3.3 Topography

Bluffs at the base of Dungeness Spit are approximately 90-100 feet high while bluffs west of the spit rise to about 130 feet. The forested areas within the Dungeness Unit are primarily between 90 to 130 feet NAVD88. The headquarters complex is located at approximately 140 feet.

3.4 Refuge Geology

The feeder bluffs are typically composed of Holocene-Pleistocene undifferentiated surficial (clay, silt, sand, gravel, till, diamicton, and peat) and landslide deposits (clay, silt, sand, gravel, and larger blocks deposited by mass wasting) that are at the edge of Pleistocene glaciomarine drifts (Schasse 2003).

3.5 Soils

All soil types and descriptions are mapped and described in the Soil Survey of Clallam County Washington and can be found on the USDA Web Soil Survey website at http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx (July 27, 2015). The data for Clallam County Area (WA609) was updated in 2013.

The soils surrounding the Mellus cabin are made up mostly of dick loamy sand. Hoypus gravelly sandy loam makes up the soil profile of the administrative area and the Refuge entrance. Both types of soil are very deep, somewhat excessively drained soils formed in glacial outwash and found on outwash terraces. Permeability of these soils is rapid with a low water capacity. Consequently, runoff is slow. The effective rooting depth for both soils is 60 inches or more. Below a mat of organic material, the surface layer of Dick loamy sand is grayish brown and dark brown loamy sand about 3 inches thick. The next layer is brown sand about 19 inches thick. The upper 26 inches of the underlying material is light olive brown and yellowish brown, stratified sand to loamy sand, and the lower part to a depth of 60 inches or more is olive brown and dark yellowish brown, stratified gravelly sand to gravelly loamy sand. The surface of Hoypus gravelly sandy loam is typically covered with a mat of organic material 1 inch thick. The surface layer is very dark grayish brown gravelly sandy loam 3 inches thick. The upper 7 inches of the subsoil is dark brown gravelly sandy loam, and the lower 21 inches is dark yellowish brown very gravelly loamy sand. The upper 14 inches of substratum is dark brown very gravelly sand, and the lower part to a depth of 60 inches or more is dark yellowish brown gravelly sand.

3.6 Fire

3.6.1 Presettlement Fire History

Dungeness NWR is in the driest area in western Washington (please refer to the Precipitation section for further discussion). Consequently, prior to Euro-American settlement, the predominant vegetation on lowlands west of the Cascades, from the Willamette Valley of Oregon north to the Georgia Basin of southwest British Columbia, was a mosaic of grasslands, oak and conifer forests, savannas, and various types of wetlands (Chappell and Crawford 1997). These forests, savanna, grassland, and herbaceous bald ecosystems generally rely on fire to maintain their vegetative structure and species composition. In addition to lightning-caused fires, historical accounts have also established that Native Americans used prescribed burning to create habitat for game animals and to promote the

growth of weaving materials and food (Agee 1993, Chappell et al. 2001). The historic frequency with which a given area burned depended directly upon the number of natural and human ignited fires. Other factors affecting fire frequency and fire intensity include plant community types, changes in topography (i.e., slope and aspect), varying fuel accumulations, and variation in seasonal precipitation. The advent of Euro-American settlement interrupted Native American land management practices and altered the natural fire regime by eliminating prescribed fires and suppression of natural fires.

The watershed of the Dungeness River has experienced repeated large, intense wildfires prehistorically as a result of a number of climatic patterns, including long-term temperature cycles, a rain shadow effect from the adjacent Olympic Mountains, jet stream patterns, and prevailing west-to east winds (DAWACT 1995, BOR 2002). Large, intense, stand-replacement wildfires have swept across the watershed at intervals of approximately 200 years with surviving older trees generally restricted to higher elevations and along riparian corridors. Present data indicate that large, stand replacing fires occurred in A.D. 1308, 1508, and 1701 in the Dungeness watershed (DAWACT1995). The intervals between these fires were long enough to permit growth of a replacement stand and accumulation of both ground and ladder fuels within the forest (BOR 2002).

3.6.2 Post-settlement Fire History

In the areas dominated by Douglas-fir the natural fire regime was probably similar to that described by Agee (1993) in coastal Douglas-fir forests. The majority of fires in the region are human-caused and starts occur during the dry summer months. A large, human-caused fire occurred in 1890 in the foothills between Port Angeles and Sequim, smoldered over the winter, and flared up again in 1891. Although not as extensive as the prehistoric fires, the 1890-1891 fire burned large areas of the lower Dungeness watershed. Numerous smaller fires have also occurred in the watershed with significant ones reported in 1860, 1880, 1896, 1902, 1917, and 1925. Few fires have occurred in the watershed since 1930, largely as a result of improved fire prevention techniques and increased levels of summer precipitation (DAWACT 1995, BOR 2002).

All known fires at Dungeness NWR were human-caused. The 1969 Dungeness Annual Narrative related the investigation of a fire started on June 3, 1969 when U.S. Coast Guard personnel were burning their garbage dump behind the residence. High winds caused the fire to quickly spread into the dry grass and driftwood affecting a total of 17 acres. Driftwood logs tend to smolder for weeks after the initial burn. The 1971 Dungeness Annual Narrative reported a fire at the junction of the main spit and Graveyard Spit on June 27 and 28, of that year. The 1983 Dungeness NWR Fire Management Plan states that between 1980 and 1983, two small unwanted fires originated on the spit from Native American campfires. In June 1989, the Ravine Fire burned 0.1 acre near the eastern boundary of the mainland portion of the Refuge. In June 1999, the Dungeness Fire burned 1 acre on Dungeness Spit, and a month later, the Lighthouse Fire burned 50 acres at the extreme end of the spit. The latter fire burned around New Dungeness Light Station with no damage.

3.7 Environmental Contaminants

3.7.1 Air Quality

The air quality may be affected by various activities on and adjacent to the Refuge including: marine vessels, industrial facilities, automobiles, and other human caused activities such as outdoor burning, wood stoves, and operation of various vehicles and machines (e.g., gasoline powered equipment, motorboats). The Refuge staff uses various types of equipment and transportation methods to achieve the Refuge habitat conservation projects and research. Habitat improvement projects and monitoring activities may include the use of tractors, heavy equipment, and/or the operation of trucks, boats, or other transport. Refuge visitors generally drive their automobiles to visit the various units of the Refuge and others operate motor boats within Dungeness Bay to fish or access the lighthouse.

3.7.2 Water Quality

Water quality at the Mellus cabin has been satisfactory when tested for nitrate, nitrite, coliform bacteria, lead, and copper. However, the water does have an unpleasant sulfur odor which impacts its drinking quality. The new quarters structures would be serviced by a community water system which has also passed as satisfactory when tested. The community water system provides water that is clear and free of odor. The well at the Mellus cabin would only be used to wash small equipment (e.g., ATVs, UTVs, and tools) in the future, eliminating the need for potable water testing.

3.7.3 Contaminants

Considering the historical uses of Dungeness NWR environmental assessment studies have revealed some threats to the Refuge from contaminants. Some of these contaminant issues have already been addressed while others remain. Jurisdiction issues and other factors (e.g., exposure risks, funding, location, concentration, potential for movement of the hazard, and accessibility) influence the timing of remediation. Historical uses included military, navigational aids (lighthouse), residential, and commercial.

The Mellus Cabin, located in the Dungeness Unit, was surveyed for Asbestos Containing Material (ACM) and Lead Based Paint (LBP) in 2010 by the USFWS Regional Environmental Compliance Coordinator. A small area of interior floor tile contains low levels of ACM and there was no detection for LBP on any surface. The Service will be required to contract remediation services prior to any construction work.

Chapter 4. Biological Environment

This chapter addresses the biological resources and habitats that may be affected by demolition of the Mellus Cabin and/or construction of new facilities.

4.1 Biological Integrity, Diversity, and Environmental Health

The National Wildlife Refuge System Administration Act, as amended, directs the Service to ensure that the biological integrity, diversity, and environmental health (BIDEH) of the Refuge System are maintained for the benefit of present and future generations of Americans. The BIDEH policy (601 FW 3) defines biological integrity as "the biotic composition, structure, and functioning at genetic, organism, and community levels comparable with historic conditions, including the natural biological processes that shape genomes, organisms, and communities." Biological diversity is defined as "the variety of life and its processes, including the variety of living organisms, the genetic differences among them, and communities and ecosystems in which they occur." Environmental health is defined as the "composition, structure, and functioning of soil, water, air, and other abiotic features comparable with historic conditions, including the natural abiotic processes that shape the environment." In simplistic terms, elements of BIDEH are represented by native fish, wildlife, plants, and their habitats, as well as those ecological processes that support them.

The Refuge System policy on BIDEH (601 FW 3) also provides guidance on consideration and protection of the broad spectrum of fish, wildlife, and habitat resources found on the Refuge and in associated ecosystems that represents BIDEH.

4.1.1 Historic Conditions

Prior to Euro-American settlement, the area surrounding the Refuge and the Olympic Peninsula generally was heavily forested to the saltwater edge, except for occasional meadows, prairies, open water, and wetland areas. Western red cedar and Douglas-fir were the dominant conifer tree species. Western hemlock was scattered in all native conifer stands. The climax forests were renowned for producing trees of impressive size. Deciduous hardwoods were found within the conifer stands, primarily in riparian zones such as stream corridors and wetlands, including red alder, big leaf and vine maples, willow, and black cottonwood. Pacific madrona, a broadleaf evergreen, was also found at lower and drier elevations.

4.1.2 Habitat Alterations since Pre-settlement Times

Removal of Vegetation

Sometime prior to 1965 the upland forest was cleared in the area surrounding the Mellus cabin, on 1-2 acres of bluff top southeast of the cabin, and in the Refuge administrative area.

Invasive Plants in Upland Systems

Major invasive weeds that have invaded Refuge upland habitats include English holly and Canada thistle. These species occupy a small percentage of Refuge lands individually, but combined they can displace native vegetation on the Refuge.

4.2 Mixed Coniferous Forest

4.2.1 Overview

This habitat type occurs in a mosaic of two ecological systems: North Pacific Maritime Dry Mesic Douglas-fir-Western Hemlock Forest and North Pacific Maritime Mesic-Wet Douglas-fir-Western Hemlock Forest. Sites where moisture is high are co-dominated by western red cedar, Douglas-fir, western hemlock and/or grand fir, with significant amounts of sword fern in the understory. Red alder is found as an overstory tree in some forests where clear-cut harvest formerly occurred, along riparian areas, and as an understory tree in younger conifer forests and areas of recent disturbance. Understory shrub and herbaceous vegetation in these forest types typically include salal, oceanspray and sword fern.

There are approximately 57 acres of second-growth forest within the Dungeness Unit. A relatively homogenous stand of Douglas-fir is located along the western boundary of the Dungeness Unit with DBH ranging from 10-20 inches and canopy cover ranging from 40-70%. This stand supports few short snags (up to 20 feet) and a dense understory composed primarily of oceanspray and salal. To the north and east, the forest becomes a more complex stand of second-growth dominated by Douglas-fir, western hemlock, and western red cedar. This forest supports a mosaic of snags; downed woody debris; broken-top or candelabra-shaped trees; live trees of various heights and diameters; as well as a varied understory dominated by sword fern, oceanspray and salal.

Historically, a moderate-severity fire regime involving occasional stand-replacement fires and more frequent moderate-severity fires created a complex mosaic of stand structures across the landscape.

4.2.2 Regional Distribution, Conditions and Threats

Forests in western Washington have been extensively managed for timber production; today, 3% of forests in this area are considered old-growth (WDFW 2005). Harvest of old-growth and mature forests for commercial timber and paper production has resulted in loss of species diversity and forest complexity on most of the landscape due to planting of even-aged, monotypic stands, and short harvest rotations. The forest stands on Dungeness NWR is second-growth with remnant patches of mature forest, but lack key old-growth forest characteristics such as downed woody debris and snags. The forest is exposed to significant wind events along the Strait and blow down is a recurring natural event. Historically, occasional intense winter windstorms occurred with a frequency of once or twice every few decades, although their frequency has increased during this decade. Major stand-replacement fires impacted much of the Olympic Peninsula in the early 1500s and 1700s. Threats facing the forested habitats on Dungeness NWR include altered fire regime, climate change, invasive species, insect or disease infestation and human-caused wildlife disturbance.

4.2.3 Key Species Supported

Mixed coniferous forests provide nesting habitat for pileated, downy and hairy woodpeckers; red-breasted sapsucker; rufous hummingbird; bald eagle; sharp-shinned and Cooper’s hawks; Pacific-sloped flycatcher; northwestern crow; chestnut-backed chickadee; Bewick’s wren; golden-crowned kinglet; Townsend’s warbler; spotted towhee; and pine siskin, to name just a few. Other species such as varied thrush visit during the winter months. Black-tailed deer can be found here year-round. Many bats and amphibians are associated with mixed coniferous forests including Townsend’s big-eared bat; Keen’s, long-eared and long-legged myotis; ensatina and northwestern salamander.

Four species of amphibians are known to occur in Refuge forests and wetlands: red-legged frog, rough-skinned newt, northwestern salamander, and Pacific chorus frog. An additional eight species

have the potential to occur on Refuge lands but have not been confirmed: ensatina; Cope's giant, Olympic torrent, long-toed and western red-backed salamanders; Cascades and coastal tailed frogs and western toad. Pacific chorus frog, northwestern salamander red-legged frog, and rough-skinned newt are common in western Washington. The remaining species have the potential to occur on the Refuge because the Refuge occurs within their ranges and appears to provide suitable habitat. Very little information is available on historic distribution or trends of amphibians.

Degradation, fragmentation, and loss of habitat all pose serious threats to amphibians. Many amphibians are long lived and reach sexual maturity after many years of growth. As a result, adult survival is considered a limiting factor for amphibians. In addition, their dispersal or migration distance is relatively limited to the immediate area around their breeding ponds, streams, or forests. For these reasons amphibian populations are relatively isolated and habitat buffers are increasingly important. Buffers provide cover, protection from siltation, filtration of pollutants, and protection from trampling. Human disturbance from road and trail construction, timber harvest and fire management may result in fragmentation of terrestrial habitat and breeding ponds (Graham and Powell 1999, Paton 2002). Introduction of invasive or nonnative predators and contamination are additional threats. Nonnative species can have devastating effects on amphibian abundance. The effects of climate change on amphibians are uncertain; however, impacts are anticipated as a result of changes in key habitat attributes (e.g., reduced soil moisture, increased temperatures, and changes in prey species phenology).

Most amphibians spend a large part of their life near streams and wet environments within the forested habitats. Northwestern and long-toed salamanders, western toad, red-legged and Pacific chorus frogs, and rough-skinned newt require wetlands or ponds with tall emergent vegetation or downed woody debris to provide some degree of structure within the shallow water margin to support eggs. In addition, these species all require rotting logs, rodent burrows, and moist crevices found in downed woody debris of forested habitats during the remainder of their life cycle. Amphibians typically require more than one habitat type for their life history needs. For instance, many amphibians lay their eggs in ponds, the larva develop and metamorphose in those same ponds. They then spend their adult life in the forests within a ½ mile of those ponds, returning in later years to lay eggs and the cycle continues. Thus, providing suitable corridors between habitat types is important, particularly to maintaining adult survival. Ensatina and western red-backed salamanders differ in that they rely exclusively on forested habitats with no wetland component to their life history needs. Woody debris, bark piles, and snags all provide important habitat components for these species, particularly in mature or old-growth forests. While home ranges of salamanders tend to be very small, on the order of a few meters to a few dozen meters in diameter, some salamanders will disperse up to several hundred meters. Frogs and toads can move up to 1.5 miles; however, frogs especially appear to prefer to remain close (<700 meters [2,297 feet]) to their breeding sites (NatureServe 2011).

4.2.4 Refuge Management Activities

Since becoming part of the National Wildlife Refuge System, there have been very limited management actions within the forested habitat. The forest was harvested selectively prior to acquisition by the Refuge. Active IPM has occurred in primarily in control of English holly and English ivy. Although no fires have been noted within the forest in recent history, the Refuge ascribes to a full fire suppression policy.

4.3 Threatened, Endangered and Sensitive Species

There are no Endangered or Sensitive Species found within the forest or administrative area at Dungeness NWR.

4.4 Exotic and Invasive Plant Species

Many invasive plant species infest and degrade the terrestrial habitats on the Refuge. Several plant species were introduced as ornamental plants (e.g., Oxeye daisy and Dalmatian toadflax) and have escaped and spread into barrier beach, grassland, forest, and riparian habitats. Some highly invasive species (e.g., common cordgrass and Canada thistle) can produce monotypic stands that completely displace native and desirable plant communities. Native plant communities provide essential habitat that supports high priority species and species groups on the Refuge (e.g., migratory birds). The Refuge's overall strategy to manage invasive plants is based on an IPM approach. Mechanical, physical, and chemical methods are used to control invasive plants as a basis for achieving desirable habitat conditions. Many factors affect efficacy of control efforts for invasive plants. For species with the largest infestations within the Refuge (e.g., Canada thistle), IPM strategies involve treating new spot infestations while working to eradicate the main infestation areas.

There are seven species of plants found on the Refuge (Table 4-5) which are classified by the Washington Department of Agriculture as noxious weeds.

The plants listed below are of the highest priority for the Refuge and are part of invasive species management.

Common Cordgrass Spartina angelica
Dalmatian Toadflax Linaria dalmatica
Oxeye daisy Leucanthemum vulgare
Bull thistle Cirsium vulgare
Canada thistle Cirsium arvense
Common (English) Ivy Hedera helix
English Holly (Ilex aquifolium)

4.6 Paleontological Resources

Paleontological resources, also known as fossils, are the remains or traces of prehistoric plant and animal life that are found in the geologic formations in which they were originally buried, typically within units of limestone, sandstone, mudstone, and shale. Paleontological resources are considered to be nonrenewable and sensitive scientific and educational resources. The major laws protecting paleontological resources on Service lands are the National Environmental Policy Act of 1969 (NEPA), the Paleontological Resources Preservation Act of 2009 (PRPA), and various sections of Service regulations.

Fossil record in Northwest Washington

Because of their large size and taphonomic durability, mastodon and mammoth remains (mostly molars) are the most commonly reported Pleistocene vertebrate fossils in Washington (Barton 1998). In western Washington, mammoth finds are heavily concentrated in the central and northern Puget Lowland. The earliest mammoth finds recovered from western Washington were discovered at

Scatchet Head on Whidbey Island (located approximately 37 miles southeast of Dungeness NWR) around 1860, but these were destroyed in the San Francisco earthquake and firestorm of 1906 before they could be identified to species level (Lawson 1874 cited in Barton 1998). Another specimen from the same locality was recovered in the 1880s and is currently part of the University of California, Berkeley paleontology collections. This specimen is clearly from a Columbian mammoth. Of two species of mammoth found in Washington (M. imperator and M. columbi), Barton (1998) states that the Columbian mammoths are by far the most common. Of 31 previously reported finds that could be analyzed to species level in the Puget Lowland, 27 proved to be from Columbian mammoths (Barton 1998). The Columbian mammoth formally became the Washington state fossil in 1998.

Dungeness NWR

In 1989, a two-foot section of a mastodon tusk was discovered by a visitor at the base of the bluff near the sanitary facilities on Dungeness Spit and turned over to the Refuge's manager (Raymond 1989). An April 1990 incident report notes that a visitor found what was identified as a mammoth tooth on Dungeness Spit approximately ½ mile out on the outer beach (Strait side). The tooth was turned over to a Refuge volunteer.

In March 1994, a Sequim resident examining the cliff of glacial till after a storm discovered the stump end of a mammoth tusk. The find was confirmed by paleontologist Bruce Crowley of the Burke Museum. The specimen was reported to be 6 feet long. According to USFWS Regional Cultural Resources Team records, a loan agreement was prepared for long-term curation of the tusk at the Burke Museum. The agreement is long-expired, and no additional action has been taken regarding the item. A newspaper article prepared at the time of the discovery noted that the "mammoth tusk appears to be entombed in a 100,000 year-old layer of glacial debris and clay known to contain a lot of fossils and to be possibly associated with volcanic mud flows" according to amateur paleontologist Richard Dobbs, who discovered the fossil (Seattle Times, accessed online at http://community.seattletimes.nwsource.com/archive/?date=19940329&slug=1902831, 21 Feb 2012). Although no other known specimens have been documented, the possibility of finding paleontological resources on the Refuge is considered high. The collection and curation of paleontological resources should be managed under the Department of the Interior's Museum Property program and the Paleontological Resources Preservation Act (PRPA) of 2009.

Chapter 5. Human Environment

5.1 Cultural Resources

5.1.1 Native American Overview

Prehistory
Jeanne M. Welch and R.D. Daugherty prepared a compilation of the prehistoric era on the Olympic Peninsula as part of their background information for a 1988 survey project on Dungeness NWR (Welch and Daugherty 1988). The following information is paraphrased from their report. The five periods of occupation for the region proposed by Eric Bergland (Bergland 1984) cover approximately 12,000 years and include: Early Prehistoric, Middle Prehistoric Early Maritime, Prehistoric, Northwest Coast Pattern, and Historic. On the Olympic Peninsula, the prehistoric people are characterized as small groups of hunters and gatherers who moved around to utilize both terrestrial and maritime resources. This period on the peninsula is represented by the Manis Mastodon site (45CA218) which attests to the hunting of large game animals. It is likely that the onset of the Middle Prehistoric saw an increase in the use of maritime resources such as anadromous fish. By the Early Maritime period, proposed to have begun around 3,000 years before present (BP), the use of maritime resources was well established. It is likely that the cultural manifestations of these later prehistoric periods resembled those of the ethnographic period, but details such as the existence of villages with large, cedar plankhouses are uncertain. During the Prehistoric Northwest Coast Pattern period, which began 1,000 years BP, chipped stone assemblages virtually disappeared while large plankhouse villages became prominent. As Welch and Daugherty note, however: “Bergland’s presumed appearance of cedar plank house villages at this time is based largely upon negative evidence and it may be that this type of settlement pattern is somewhat older, thus, there may have been many significant elements of continuity between the Early Maritime and Prehistoric Northwest Coast periods” (Welch and Daugherty 1988).

Ethnography
Ethnographically, the Refuge is located within the territory of the “Central Coastal” or “Straits” Salish Klallam people (Welch and Daugherty 1988). Tribal groups lived in large winter villages along the shoreline or at mouths of rivers to access the marine resources. The villages housed extended families. They utilized spits for gathering shell resources and as launch sites for fishing. Spits were also used for burial grounds (Kennedy 1981). During the summer season the villagers would break into smaller groups and move inland to gather plants and berries and to hunt. Along with the Quinault, the Klallam were the only Coast Salish who hunted whales (Suttles 1990). Canoes made of red cedar were central not only to the survival of the Klallam as a source of transportation, but also featured in their burial practices. In 1868, Graveyard Spit was the site of a massacre of Tsimshian Indians that gave the spit its name.

Contemporary
The Klallam continue to occupy the Olympic Peninsula with tribal communities in three locations, consisting of the Port Gamble S’Klallam, the Lower Elwha S’Klallam, and the Jamestown S’Klallam, all of whom were signatories to the Point No Point Treaty of 1855. Initially, many Native Americans patented lands under the Indian Homestead Act, but policy changes reversed the trend toward private ownership. Suttles notes that “around 1875 the Dungeness people were forced off their traditional site and bought land nearby to establish the settlement of Jamestown….Jamestown

received federal acknowledgment in 1980" (Suttles 1990). According to Jamestown S'Klallam tribal history, despite the fact that they were nearly reorganized into a larger S'Klallam tribe with the other two groups during the Indian Reorganization Act period (1935-1939), the tribe chose to stay on the land they had purchased in 1875 rather than relocate (Jamestown S'Klallam Tribe 2012). Among the consequences of this decision was the termination of their recognition by the federal government in 1953. The continuity and stability of their land base contributed to a sense of group identity and independence. The push for recognition lasted from 1974 until achieved on February 10, 1981.

Known Prehistoric Sites

While there are no prehistoric archaeological sites recorded on the Refuge, there has been very little systematic archaeological survey or testing conducted. A large portion of the approved boundary is tidelands, generally not a conducive environment for archaeological survey. Evidence of buried prehistoric archaeological use of the bluff above Dungeness Spit is unlikely because of the glacially deposited sediments. The dense forest stand generally precludes observation of the surface. However, the presence of known cultural resources in areas adjacent to the Refuge indicates that the potential exists for sites to be identified within Refuge boundaries in future.

5.1.2 Euro-American Overview

Although first visited by explorers as early as 1790 when Captain Manuel Quimper inspected the area, the first Euro-American settlers came to the Dungeness area in 1851 while the region was still part of the Oregon Territory. The Washington Territory, which separated from Oregon Territory in 1853, established Clallam County in 1854 (Welch and Daugherty 1988). Within the next few years, a thriving community was established east of what is now the Refuge. Whiskey Flat was named as the county seat in an 1860 election, though two years later New Dungeness was designated as such. These two communities were located essentially in the same location; the latter was located above the former on the bluffs. By 1892, the present location of the town of Dungeness was established as the community center (Kennedy 1981). The heavily forested bluff margin northwest of the Whiskey Flat and Dungeness communities was not developed during the early historic period.

The New Dungeness Light Station, which began operating in 1857, was built by the Lighthouse Board at the behest of Congress. Travel during the nineteenth century was primarily along the coastline by watercraft, few roads were constructed through the very dense, rugged terrain of the interior. The earliest road from Sequim to Port Angeles was not developed until 1890-1891. The timbered slopes and old growth forests supplied lumber to San Francisco during the gold rush along with the spruce trees needed for manufacture of World War I aircraft (Welch and Daugherty 1988). Lumber mills and shingle mills were established on nearly every water way around the peninsula as fluming logs down the rivers was the easiest method for getting the logs out of the mountains. The timber industry continued to be the largest economic employer into the twentieth century.

Agriculture and ranching is productive in pockets where micro-climates provide shelter from the very wet conditions of the Salish Sea. Cold weather crops such as potatoes, wheat, oats, peas, hay, and hops thrive. Located on the inland road system, Sequim was incorporated in 1913 and by 1914 the town had its own telephone franchise and electricity (Welch and Daugherty 1988).

Establishment of Dungeness NWR

The Refuge was established by Executive Order (E.O.) 2123 on January 20, 1915, by President Woodrow Wilson, for the purpose of preserving land "…as a refuge, preserve and breeding ground

for native birds." The original 226.02 acres were known as the Dungeness Spit Reservation. The name was changed to Dungeness National Wildlife Refuge on July 25, 1940, by Presidential Proclamation 2416. Over the years, various tracts of land and tidelands have been acquired in fee title or easement within the approved Refuge boundaries. Today, Dungeness NWR is 772.52 acres in size. During World War II, the general area was used as an Army encampment, and a 147-acre tract on Dungeness Spit acquired in 1940 was reserved for use by the Navy until the requirement was terminated in 1955. Additional tracts were added in the following decades, including the Mellus, acquired in the early 1970s. However, very little development of the Refuge was undertaken until the 1980s when the parking lot, hiking trails, and interpretive signs were installed.

Known Historic Sites
With the exception of the small inholding owned by the U.S. Coast Guard (USCG) at the end of Dungeness Spit, all parcels within the approved boundary of Dungeness NWR are currently owned under fee title or managed through easements, and consist primarily of tidelands and beach.

On those parcels where habitation is feasible, historic features associated with previous landowners can and do occasionally occur. Some upland habitat occurs in the bluff above Dungeness Spit and on the Dawley Unit. However, historic use of the bluff was isolated, with just a few homesteads and settlers in the nineteenth century. Use was limited until roads were established. In the 1940s, the military used the area for an encampment and training ground.

The bluff area is heavily forested, far from transportation corridors, and lacks productive agricultural values. Therefore, settlement and development of this area lagged behind property closer to the community centers. Based on previous surveys and background research, prehistoric, ethnographic, and early historic period archaeological resources are not expected in the bluff area.

5.1.3 Current Knowledge of Local Cultural Resources and Archeological Sites Occurring Within Potential Construction Sites

Mellus Cabin: T31N R4W Section 27 Dungeness 7.5-minute USGS quad
The Mellus Cabin was recorded in 2006 (Speulda 2006). Based on a review of maps and an understanding of the military timeline, it appears that the cabin was likely built sometime in the early 1950s. Walter B. Mellus purchased the parcel in 1940 with no improvements during a period when the military presence may have limited his access to the area. He lived in the cabin along with a caretaker until his death in 1973, a year after the land had been sold to the U.S. Fish and Wildlife Service. Although the initial Service inventory documented two cabins and an outhouse on the parcel, when it was recorded in 2006 only the original 10 x 23-foot cabin remained. The cabin was remodeled prior to acquisition by the Service and was subsequently renovated in the 1980s to serve as temporary Refuge staff housing. A garage was added in 1992. The Cabin currently serves as quarters for a full-time volunteer Refuge caretaker.

Determination of Eligibility: It was determined that the Mellus Cabin does not meet NRHP eligibility criteria. The cabin was constructed after World War II and is not associated with any historic period, theme, or event. Mr. Mellus was not a prominent citizen in the area and does not appear in the historical record. The cabin's original appearance may have been rustic, but changes over the years destroyed the original characteristics. No archaeological materials were noted.

Status: Slated for demolition since 2006.

5.1.4 Previous Archaeological Research

Three previous archaeological surveys of the Dungeness NWR contain information about the setting and potential for cultural resources within the Refuge. In 1907, Harlan L. Smith and company documented numerous shell middens and burials in the vicinity of what is now Dungeness NWR. Smith's survey encompassed the whole of the Gulf of Georgia and Puget Sound (Jesup North Pacific Expedition directed by Franz Boas of the American Museum of Natural History). According to Smith in his acknowledgments, William H. Thacker conducted reconnaissance on Smith's behalf in the "San Juan group" during the summer of 1898. He continues, "In 1899 we examined the shell-heaps on Puget Sound, the Straits of Juan de Fuca as far west as New Dungeness" (Smith 1907). Site 45CA239 Tse'esqut Village, the ethnographically recorded site near New Dungeness Townsite is likely one of the sites described above.

In 1981, Robert Thomas and Hal Kennedy conducted an intensive surface survey of six sites proposed for development on the Dungeness NWR. Results of the investigations at these six locations were all negative, no cultural resources were identified (Kennedy 1981). Based on their research and review of other topographic areas similar to the bluff where they were surveying, Thomas and Kennedy prepared a list of categories of cultural resources that might be expected. These included isolated artifacts, burials, early archaeological sites (ca 60,000-8,000 years old), and ethnographically documented archaeological sites (Kennedy 1981). They also noted that "Because soil conditions are related to glaciomarine and recessional outwash, buried archaeological sites would not be expected" (Kennedy 1981).

In 1988, Jeanne Welch and Dr. Richard Daugherty completed a survey and limited subsurface testing (augering) of the proposed enlargement of the parking lot at Dungeness NWR. No cultural resources were identified by this field effort. Other archaeological investigations that have occurred at Dungeness NWR include survey for a vault toilet installation and environs (Raymond 1989, Valentine 1993), and the evaluation of the Mellus Cabin (Speulda 2006).

5.2 Refuge Facilities Associated with Potential Construction Sites

5.2.1 Entrances, Access Points, Roads and Trails

Entrances and Access Points
The Mellus Cabin is primarily accessed through the primary public entrance point for the Refuge. This entrance is located adjacent to the public parking area at the north end of Voice of America Road within the Clallam County managed Dungeness Recreation Area. Refuge staff may also access the Mellus Cabin by entering the Refuge on an access easement off of West Anderson Rd. This access requires navigation of an extremely sharp corner, which precludes it from being used by most vehicles.

The primary access for the administrative area is located at the north end of Holgerson Road, and is gated.

Roads

The Refuge Complex Headquarters compacted gravel access road located at the northern end of Holgerson Road is 490 feet long and was completed and chip sealed in 2009. It provides access to all three buildings at the headquarters and includes a staff parking area with room for approximately 7 vehicles. The parking area also includes a 12 x 36-foot concrete RV pad with water and electrical hook-ups and a sewage discharge connection.

Two parking lots leased from Clallam County at the north end of Voice of America Road in the Dungeness Recreation Area service the main entrance. The main lot is chip sealed and contains 63 vehicle spaces including two Americans with Disabilities Act (ADA) compliant parking spaces. The "overflow" lot is a mixture of compact gravel and chip seal and contains spaces for 12 additional vehicles including one concrete paver ADA compliant disabled parking space. There is an emergency and maintenance beach access road and right of way through private property at the end of West Anderson Drive. That access includes a locked gate and is not available to the public.

Trails
Public access to the Refuge Complex headquarters from the Refuge entrance station and parking area is via a 404 linear feet concrete paver walkway which incorporates an ABA/ADA compliant parking space. The main trail connects the entrance station to the Mellus Cabin and Dungeness Spit is 2,115 linear feet. It is constructed of compacted gravel and was resurfaced and modified in 2011. Staff and contractors use ATV/UTVs and vehicles on this trail on occasion. Using vehicles on this trail can be difficult because of high public use (i.e., foot traffic) and sharp corners. The primitive trail is also a dirt trail measuring 3,110 linear feet and connects to the main trail near the entrance and terminates at the main trail just to the south and east of the Mellus Cabin.

5.2.2 Buildings and Other Structures Adjacent to Construction Areas

Administrative Area Buildings
The Washington Maritime National Wildlife Refuge Complex headquarters is located at 715 Holgerson Road in Sequim, Washington. Public access is located at the north end of Voice of America Road in the Dungeness Recreation Area. The headquarters consists of an administrative building (3,756 square feet), shop building (3,848 square feet), and an equipment storage building (2,220 square feet), all completed in 2009.

Mellus Cabin
The Mellus Cabin is located in the forest on the bluff above the base of Dungeness Spit where the primitive trail joins the main trail and descends to the beach. Although the property was purchased by Mr. Mellus in 1940, the cabin (750 square feet) was not constructed until sometime in the early 1950s. The Mellus Cabin was used as the Refuge caretaker's residence until 2015. There is a septic system associated with the residence. Adjacent to the Mellus Cabin is an equipment storage garage built in 1992 (400 square feet) and a pump house built in 1973 which services a well drilled in the 1940s.

Entrance Area
In 2011, the Service constructed a new entrance station in the "Northwest" timber frame style adjacent to the public parking area at the main trailhead. The station includes two structures, a fee station, and an interpretive kiosk with an attached structure containing three public trash/recycle cans. The facility includes four wood outdoor benches and a metal bicycle rack. A garbage storage structure located near the public restrooms was also constructed in a similar style and includes a

dumpster and three public trash/recycle cans. There is a second smaller fee station constructed in 1987 located at the primitive trailhead.

Overlooks
There are two viewing decks totaling 1,300 square feet near the north end of the primitive and main trails adjacent to the Mellus Cabin with benches and telescopes overlooking the Dungeness Spit. The upper deck is wheelchair accessible.

Leased Restrooms
The Refuge leases a public restroom facility and drinking fountain (425 square feet) built in 1973 from Clallam County. It is located next to the public parking area, also leased from Clallam County, adjacent to the main Refuge entrance station and includes a 1,000 gallon twin vault septic system and drain field constructed around 2005 and located to the west of the building. However, that system is not able to handle the heavy use associated with the busiest visitor use days the Refuge experiences.

In 2011, the Service constructed an additional septic system for that facility on County property to increase capacity. A 2,000 gallon pump tank was added with a high capacity pump and aqua works controls. A much larger drain-field was added and includes ten 3 x 1 foot trenches, five measuring 60 feet in length and five measuring 70 feet in length. Pipe was installed in each trench which is designed to equally disperse effluent. The old system was left in place and a connecting valve was added to allow selection of the old or new system depending on needs. Unfortunately, the new system is not currently pumping as efficiently as expected and staff is exploring maintenance and upgrade options to increase effectiveness of the system.

Administrative Area Septic
Infrastructure at the Refuge Complex headquarters includes an on-site wastewater treatment/disposal system with two 1,000-gallon septic tanks, 250 linear feet of 4-inch diameter PVC effluent piping, and two gravel-less 60-foot long chamber drainfields; all installed in 2009.

Administrative Area Water
The domestic water system is tied to the Dungeness Recreation Area's domestic water which is supplied by a community water company. It is comprised of 800 linear feet of 3-inch diameter PVC pipe, a 500-gallon storage tank, booster pump/controls, 1-inch diameter flowmeter, pressure sustaining valve, and 240 linear feet of 2-inch diameter PVC piping to the office building. The electrical infrastructure includes underground utilities (15 KV underground power cable in 2-inch PVC conduit (137 linear feet offsite and 643 linear feet on-site)); 75 KVA transformer; CT enclosure; 2 electric meters; and two 2-inch diameter conduits with underground power to the office, all installed in 2009.

5.2.3 Fencing

There is split rail and/or plank fencing surrounding most of the headquarters complex as well as delineating the Refuge property from the County recreation area. There is also plank rail fencing delineating the area which is closed to the public around the Mellus Cabin from the public trail. A few small fence sections also line both the main and primitive trails.

In 2009, contractors installed 953 linear feet of split rail fencing on the southern and eastern boundary of the headquarters complex as part of the new headquarters construction. That fence

includes an electronic security gate at the north end of Holgerson Road. Later in 2009, Refuge volunteers installed an additional 247 linear feet of split rail fencing in the staff parking area, around the new Complex office entrance, and at the entrance to the primitive trail. In 2011, 134 linear feet of split rail fence was added between the overflow parking area and the office path and behind the fee station. Heavy plank rail fencing runs 1,389 linear feet from the east of the garage building to the west end of the public parking lots.

The Mellus Cabin is separated from the main trail by 206 linear feet of plank rail fencing.

5.3 Public Use

None of the potential construction sites are currently open to the public. However, the Mellus Cabin and any site within the wooded area would be immediately adjacent to and/or in close proximity to the main and primitive trails.

Dungeness NWR offers visitors a limited variety of recreation opportunities and is visited by an estimated 75,000 - 80,000 people each year. Almost all of these visitors use the entrance located on the main trail to access the Refuge (a small percentage access the Refuge by boat at the New Dungeness Light Station landing site).

A trail lined with pavers provides public access to the Refuge Headquarters office. A small percentage of visitors walk to the office to buy entrance passes or pick up information.

5.3.1 Visitation

The Refuge is a popular regional destination. However, determining actual visitation is problematic due the Refuge's "honor" system where visitors are required to enter the number of people in their party on their fee payment envelope and because there is no mechanism in place to count Refuge boaters, except those that make reservations to land at the historic lighthouse. Some visitors simply do not fill out the required information and others illegally bypass the fee station altogether. As such, Refuge visitation is estimated by adding an additional 15% to the total visitor count attained from fee envelopes to account for people who do not comply with the registration requirements and for boaters who do not land at the lighthouse and those that fail to make the required reservation. Visitation has ranged in the past seven years from relative lows of about 76,000 visitors in 2009 and 2011 to a high of nearly 82,000 in 2014, despite the government shut-down that lasted much of the month of October. Between 2007 and 2011, Refuge visitation remained fairly steady (±5%) despite the onset of a severe economic recession suggesting the sluggish economy has not significantly impacted Refuge recreation trends. This may be due, in part, to the relatively low user fee of $3 per day or $12 annually per 4 adults. By comparison, many other popular recreation site user fees in the region are significantly. The local area is also considered to be a retirement community and many of the regular visitors possess lifetime "Senior" or "Golden Age" passes which cover Refuge entrance fees.

The Refuge usually experiences the highest visitation in the summer months from June through August. On average, this three month period accounts for nearly half of annual visitation. It is not unusual to have 600 or more visitors per day during the summer and very busy days may have over 900 people. The highest single day visitation on record was Sunday, September 4th, 2011, when 1,037 people were tallied entering the Refuge (USFWS 2012b).

The most popular activities at Dungeness NWR are hiking and wildlife and/or landscape viewing. Many people just want to see the Dungeness Spit and enjoy the panoramic views. Aside from the trails, the majority of visitors tend to congregate in the first ½ mile of the spit making it the busiest part of the Refuge's beach area. Visitor logs maintained at the New Dungeness Light Station suggest that approximately 10% of Refuge visitors make the 11-mile round trip hike to see the historic lighthouse. Due to the difficulty of tracking visits by boat, it is unknown how many recreational boaters use Refuge waters. However, it is estimated that an average of 275 boats visit the lighthouse each year, most of those being kayaks. By far the majority of visitors, at least 99%, access the Refuge via the upland trails.

The Refuge is used as an outdoor classroom for environmental education by regional schools and various organizations. Between 2007 and 2011, 117 educational use permits were issued for the Refuge covering 879 adults and 3,496 youths. On average, 23 permits covering 176 adults and 699 youths are issued annually. While specific curriculums vary, permits require that the course of study focus on the wildlife, plants, geology, marine environment, or history of Dungeness National Wildlife Refuge.

5.3.2 Illegal Refuge Uses

The most frequent illegal uses occurring on the Refuge include nonpayment of the required entrance fee, and after hours and closed area trespass. Occurring less frequently are dog walking, bicycle riding, littering, climbing on closed bluffs, beach combing and collecting (including drift wood collection), and unauthorized boat landings and entry into closed waters. Additional incidental illegal uses include fishing (shellfish and finfish) out of season, water fowl hunting, camping, fires, graffiti and other vandalism. Nonwildlife-dependent recreational activities that disturb wildlife such as jogging in areas closed to that activity, kite flying, and ball sports occasionally occur on the Refuge. Illegal uses persist partly due to limited law enforcement presence and a lack of public awareness of the sensitivity of Refuge wildlife to human disturbance. There is currently one dual-function Federal Wildlife Officer assigned to cover all six refuges within the Washington Maritime National Wildlife Refuge Complex. Refuge staff coordinates with other Federal officers/agents and works with the U.S. Coast Guard as well as State, county, and local law enforcement offices. The volunteer presence at the Mellus Cabin probably assists in deterring some illegal activities and increases reporting of violations, especially when the Refuge is closed.

5.4 Socioeconomics

5.4.1 Population and Area Economy

Dungeness NWR is located in Clallam County on the northern coast of the Olympic Peninsula in the state of Washington. The nearest city is Sequim, which has a population of 6,273 (U.S. Census Bureau 2012). The county population increased (11 percent) from 2000 to 2010, compared with a 14 percent increase for Washington and a 10 percent increase for the United States as a whole. County employment increased by 11 percent from 2000 to 2010, compared to a smaller employment increase in Washington (8 percent) and the United States (5 percent). Per capita income in Clallam County increased by 16 percent between 2000 and
2010, while Washington and the United States both increased by 4 percent.

The largest employer in Clallam County is the State and local government, followed by food services and drinking places.

5.4.2 Local Community

The Dungeness NWR is located approximately 6 miles northwest of Sequim, WA (pronounced "squim"). The area is famous throughout the Pacific Northwest for its low rainfall and sunny skies. Known as "Sunny Sequim" or "the Blue Hole," Sequim and the surrounding Dungeness Valley lie in the rainshadow of the Olympic Mountains, and boast an average annual rainfall of less than 17 inches. In recent years the Dungeness Valley's consistently sunny weather, unusual for Western Washington, has drawn many new residents from across the U.S. that want to enjoy the benefits of a more temperate climate, less crowded landscape, and a welcoming community. The Sequim area has become an attractive retirement community, with the average age in Sequim rising to the near 60s during the past 20 years (MySequim 2012). Despite recent declines in job growth, -0.59 % from October 2010 to September 2011 and a comparatively high unemployment rate of 11.6% (Sperling's 2011), Sequim continues to be an attractive place to retire and the fastest growing community in Clallam County (CLR 2010) ensuring an increasing demand for outdoor recreational opportunities.

5.4.3 Refuge Impact on the Local Economy

Visitors to Dungeness NWR spend money on food, lodging, equipment, transportation, and other expenses, which creates jobs within the local economy. Additionally, Refuge budget expenditures, including those provided through the Refuge Revenue Sharing Act, also result in economic impacts to the local community. The effects on the local economy associated with consumer expenditures on Refuge-related recreation and effects associated with Refuge budget expenditures are explored in detail in Chapter 6 of the Draft CCP/EA (USFWS 2012a).

Chapter 6. Environmental Consequences

This chapter provides an analysis of the environmental consequences of implementing the alternatives described in Chapter 2. Impacts are described for the main aspects of the environments described in Chapters 3 through 6, including physical, biological, cultural, and socio-economic resources. The alternatives are compared "side by side" under each topic, and both the adverse and beneficial effects of implementing each alternative are described. The overall cumulative effect on the environment from implementing the various alternatives is summarized in Section 6.7. More detailed assessments of the Refuge's cumulative effects for relevant impact topics are presented section by section.

Table 6-1 provides an overview of the long-term effects under each alternative by indicator. The effects related to implementing each alternative are described in terms of the change from current conditions (i.e., the environmental baseline). Although the analysis shows that none of the alternatives would be expected to result in significant effects, some positive (beneficial) or negative effects are expected. The qualitative terms moderate, minor, and negligible are used to describe the magnitude of the effect. To interpret these terms, moderate is a higher magnitude than minor, which is of a higher magnitude than negligible. The word neutral is used to describe a negligible or unnoticeable effect compared to the current condition. The terms identified below were used to describe the scope, scale, and intensity of effects on natural, cultural, and recreational resources.

• **Neutral/Negligible.** Resources would not be affected, or the effects would be at or near the lowest level of detection. Resource conditions would not change or would be so slight there would not be any measurable or perceptible consequence to a population, wildlife or plant community, recreation opportunity, visitor experience, or cultural resource.

• **Minor.** Effects would be detectable but localized, small, and of little consequence to a population, wildlife or plant community, recreation opportunity, visitor experience, or cultural resource. Mitigation, if needed to offset adverse effects, would be easily implemented and successful.

• **Moderate.** Effects would be readily detectable and localized, with consequences to a population, wildlife or plant community, recreation opportunity, visitor experience, or cultural resource. Mitigation measures would be needed to offset adverse effects, and would be extensive, moderately complicated to implement, and probably successful.

• **Significant (major).** Effects would be obvious and would result in substantial consequences to a population, wildlife or plant community, recreation opportunity, visitor experience, or cultural resource within the local area and region. Extensive mitigating measures may be needed to offset adverse effects and would be large scale in nature, complicated to implement, and may not have a guaranteed probability of success. In some instances, major effects would include the irretrievable loss of the resource. Direct effects are generally caused by a particular action and occur at the same time and place as the action. Indirect effects are reasonably foreseeable effects caused by the proposed action, but occur later in time.

Time and duration of effects have been defined as follows:
• **Short-term or Temporary.** An effect that generally would last less than one year or season

• **Long-term.** A change in a resource or its condition that would last longer than a single year or season

Table 6-1. Summary of Effects

	Alternative A (No Action)	Alternative B (Partial Demolition and Replacement at HQ)	Alternative C (Full Demolition and Replacement at HQ)	Alternative D (Partial Demolition and Replacement in Woods)	Alternative E Full Demolition and Replacement in Woods
EFFECTS TO THE PHYSICAL ENVIRONMENT					
Hydrology	Negligible negative	Negligible positive	Negligible positive	Neutral	Neutral
Soil	Long-term, minor negative	Long-term minor positive	Long-term minor positive	Neutral	Neutral
Air quality	Neutral	Neutral	Neutral	Neutral	Neutral
Water quality	Neutral	Neutral	Neutral	Neutral	Neutral
EFFECTS TO HABITATS AND ASSOCIATED SPECIES					
Nearshore habitats	Long-term minor negative	Long-term negligible positive	Long-term negligible positive	Long-term negligible positive	Long-term negligible positive
Mixed coniferous forests	Neutral	Minor positive	Minor positive	Negligible negative	Negligible negative
Birds	Neutral	Negligible positive	Negligible positive	Short-term negative negligible	Short-term negative negligible
Pollinators	Neutral	Negligible negative	Negligible negative	Negligible negative	Negligible negative
Amphibians	Neutral	Minor positive	Minor positive	Neutral	Neutral
Mammals	Neutral	Neutral	Neutral	Neutral	Neutral
Forage Fish	Neutral	Neutral	Neutral	Neutral	Neutral
Threatened and Endangered Species	Neutral	Neutral	Neutral	Neutral	Neutral
EFFECTS TO CULTURAL RESOURCES					
Cultural Resources	Neutral	Neutral	Neutral	Neutral	Neutral
SOCIAL EFFECTS					
Visitation	Neutral	Negligible short-term and long-term	Negligible short-term and long-term	Minor negative short-term	Minor negative short-term
Public Uses	Neutral	Long-term minor positive Short-term negligible negative	Long-term minor positive Short-term negligible negative	Long-term minor positive Short-term minor negative	Long-term minor positive Short-term minor negative
Effects on Illegal Uses	Neutral	Negligible negative	Negligible negative	Neutral	Neutral
OTHER EFFECTS					
Human Health	Neutral	Negligible	Negligible	Negligible	Negligible
Environmental Justice	Neutral	Neutral	Neutral	Neutral	Neutral
Economics	Neutral	Neutral	Neutral	Neutral	Neutral

6.1 Effects Common to All Alternatives

Integrated Pest Management (IPM). Potential effects to the biological and physical environment associated with the proposed site-, time-, and target-specific use of pesticides on refuge lands would be evaluated using scientific information and analyses documented in chemical profiles. These chemical profiles provide quantitative assessment/screening tools and threshold values to evaluate potential effects to species groups (birds, mammals, and fish) and environmental quality (water, soil,

and air). Any pesticide use must be approved through a Pesticide Use Proposal (PUP). PUPs (including appropriate Best Management Practices) would be approved where the chemical profiles provide scientific evidence that potential impacts to refuge biological resources and the physical environment are likely to be only minor, temporary, or localized in nature. Along with the selective use of pesticides, PUPs would also describe other appropriate IPM strategies (biological, physical, mechanical, and cultural methods) to eradicate, control, or contain pest species in order to achieve resource management objectives.

The effects of non-pesticide IPM strategies to address pest species on refuge lands would be similar to those effects described elsewhere within this chapter, where they are discussed specifically as habitat management techniques to achieve resource management objectives on the Refuge. Based on scientific information and analyses documented in chemical profiles, most pesticides allowed for use on refuge lands would be of relatively low risk to non-target organisms as a result of low toxicity or short-term persistence in the environment. Thus, potential impacts to refuge resources and neighboring natural resources from pesticide applications would be expected to be minor, temporary, or localized in nature, except for certain mosquito treatments necessary to protect health and safety. For more information on the Refuge's IPM strategies, please reference Appendix G of the Dungeness National Wildlife Refuge Comprehensive Conservation Plan at http://www.fws.gov/pacific/planning/main/docs/wa/docsdungeness.htm (last accessed January 1, 2016).

6.2 Effects to the Physical Environment

Topics addressed under the physical environment section include direct and indirect effects to hydrology, geology/soils, air quality, and water quality.

6.2.1 Effects to Hydrology

Alternative A: Status Quo

Under alternative A, there is no change to hydrology from current condition.

Alternative B: Partial Demolition and Replacement at HQ

Removal of the cabin and septic system and replanting of a portion of the cleared area at the Mellus Cabin site would reduce the amount of water being added to the top of the bluff and provide more natural hydrology. The addition of septic discharge from the construction of new facilities in the administrative area would create negligible change to the areas hydrology given the fact that there is already a septic system and drain field present and much larger impermeable surfaces created by the existing facilities.

Alternative C: Full Demolition and Replacement at HQ

Removal of all structures, the septic system and the well; and replanting the entire Mellus Cabin site would reduce the amount of water being added to the top of the bluff and restore the natural hydrology to the site. The addition of septic discharge from the construction of new facilities in the administrative area would create negligible change to the areas hydrology given the fact that there is already a septic system and drain field present and much larger impermeable surfaces created by the existing facilities.

Alternative D: Partial Demolition and Replacement in Woods

Removal of the cabin and septic system and replanting of a portion of the cleared area at the Mellus Cabin site would reduce the amount of water being added to the top of the bluff and provide more

natural hydrology. The construction of new facilities in any of the wooded areas would require removal of vegetation, and construction of a septic system and drain field. This action would increase the amount of water added from septic discharge, increases in impermeable surfaces, and removal of vegetation altering the natural hydrology of the site.

Alternative E: Full Demolition and Replacement in Woods
Removal of all structures, the septic system and the well; and replanting the entire Mellus Cabin site would reduce the amount of water being added to the top of the bluff and restore the natural hydrology to the site.
The construction of new facilities in any of the wooded areas would require removal of vegetation, and construction of a septic system and drain field. This action would increase the amount of water added from septic discharge, increases in impermeable surfaces, and removal of vegetation altering the natural hydrology of the site.

Overall Effects
Alternative A does not impact hydrology from its current condition. The return of natural conditions to the Mellus Cabin site in Alternatives B and C would create a minor positive impact on hydrology. Alternatives D and E would also have a positive effect through replanting at the Mellus Cabin site, but the removal of mature vegetation and addition of a septic drain field at the construction site would negate this positive effect.

6.2.2 Effects to Soil

Alternative A: Status Quo
Over time, the additional water added to the ground adjacent to the top of the bluff in conjunction with the current lack of forest vegetation could increase erosion of the bluff from sloughing near the top of the bluff face.

Alternative B: Partial Demolition and Replacement at HQ
Removal of the cabin and septic system and replanting of a portion of the cleared area at the Mellus Cabin site would reduce the amount of water being added to the top of the bluff and could reduce erosion of the bluff through sloughing near the top of the bluff face. Replanting native forest vegetation could assist in creating a more natural soil condition in areas that are currently lacking native vegetation.

Alternative C: Full Demolition and Replacement at HQ
Removal of all structures, the septic system and the well; and replanting the entire Mellus Cabin site would reduce the amount of water being added to the top of the bluff and could reduce erosion of the bluff through sloughing near the top of the bluff face. Replanting native forest vegetation could assist in creating a more natural soil condition in areas that are currently lacking native vegetation.

Alternative D: Partial Demolition and Replacement in Woods
Removal of the cabin and septic system and replanting of a portion of the cleared area at the Mellus Cabin site would reduce the amount of water being added to the top of the bluff and could reduce erosion of the bluff through sloughing near the top of the bluff face. Replanting native forest vegetation could assist in creating a more natural soil condition in areas that are currently lacking native vegetation. Creation of a new drain field would impact soil condition.

Alternative E: Full Demolition and Replacement in Woods

Removal of all structures, the septic system and the well; and replanting the entire Mellus Cabin site would reduce the amount of water being added to the top of the bluff and could reduce erosion of the bluff through sloughing near the top of the bluff face. Replanting native forest vegetation could assist in creating a more natural soil condition in areas that are currently lacking native vegetation. However removal of mature forest at the construction site could lead to increased erosion and reduction of organics in the soil over the long-term. Creation of a new drain field would negatively impact soil condition.

Overall Effects
Because of the potential for increased erosion along the bluff face over time, Alternative A could produce a long-term minor negative effect. Alternatives B and C could create long-term minor positive effects through reduced unnatural bluff erosion. Alternatives D and E could create a negligible overall effect when considering the positive effect of reduced erosion, with the negative effect of a new drain field and removal of mature forest.
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6.2.3 Effects to Air Quality
There is expected to be neutral or negligible effects to air quality from all alternatives.

6.2.4 Effects to Water Quality
There should be neutral or negligible effects to air quality from all alternatives.

6.3 Effects to Wildlife and Habitats

6.3.1 Effects to Nearshore Habitats and Associated Species
Alternative A: Status Quo
Added run-off and septic water and reduced natural vegetation at the current Mellus Cabin site will continue to cause unnatural erosion of the bluff face.

Alternative B - E:
Removal of the cabin and septic system and replanting of a portion of the cleared area at the Mellus Cabin site would reduce the amount of water being added to the top of the bluff and provide more natural erosion of the bluff face. This should allow for a more natural nutrient deposition cycle within the nearshore. The more impermeable surface is removed and the more natural vegetation is planted, the closer the site will be to natural conditions.

Overall Effects
There will be no change in the condition of the nearshore under Alternative A. Alternatives B-E will have negligible to minor positive effects on the nearshore by restoring natural processes.

6.3.2 Effects to Mixed Coniferous Forests and Associated Species
Forested Habitat
Alternative A
There will be no change to current conditions under Alternative A.

Alternatives B and C

There will be a minor positive change to the forested habitat of Dungeness NWR by replanting approximately 2 acres of native forest vegetation.

Alternatives D and E
Because mature native forest would need to be removed at the construction site of the new volunteer facility and drain field, there will be a negligible negative effect to the forest habitat of Dungeness NWR even though 2 acres would be reforested.

Overall Effects
In summary, minor beneficial effects are anticipated for Mixed Coniferous Forests and Associated Species under B and C and a negligible negative effect is expected under alternatives D and E.

Birds

Alternative A
There will be no change to current conditions under Alternative A.

Alternatives B and C
There will be a negligible positive change to forest dependent birds and a negligible negative effect on field dependent species by replanting approximately 2 acres of native forest vegetation.

Alternatives D and E
There will be a short-term negligible negative effect to forest dependent birds and field dependent birds using Dungeness NWR because mature native forest would need to be removed at the construction site of the new volunteer facility and drain field; and a long-term negligible negative effect on field dependent species because two 2 acres of open habitat would be reforested. The effect to forest dependent species would be neutralized once the newly planted forest matures.

Overall Effects
In summary, a negligible positive change is expected for forest dependent birds in Alternatives B and C. A short-term negligible effect to forest birds is expected in Alternatives D and E that will be neutralized over time. Field dependent bird species will see negligible negative effects under Alternatives B-E.

Pollinators

Alternative A
There will be no change to current conditions under Alternative A.

Alternatives B – E
There will be a negligible negative effect on pollinators by replanting approximately 2 acres of shrub and grass to native forest vegetation.

Overall Effects
Under all action alternatives there will be a negligible negative effect on pollinators.

Amphibians

Alternative A
There will be no change to current conditions under Alternative A.

Alternatives B and C
There will be a minor positive change effect on Dungeness NWR amphibians by restoring approximately 2 acres of native forest vegetation. Demolition should take place outside of the amphibian migration window to avoid short-term negative effects to amphibians.

Alternatives D and E
Because mature native forest would need to be removed at the construction site of the new volunteer facility and drain field, there will be a neutral effect to amphibians even though 2 acres would be reforested. Construction and demolition should take place outside of the amphibian migration window to avoid short-term negative effects to amphibians.

Overall Effects
Alternatives B and C would provide a minor positive effect on amphibians utilizing Dungeness NWR while Alternatives D and E would produce both positive and negative effects that result in an overall neutral effect. Under all action alternatives, construction and demolition should take place outside of the amphibian migration window to avoid short-term negative effects.

Mammals
Alternative A
There will be no change to current conditions under Alternative A.

Alternatives B - E
Considering the positive impacts of restoring habitat and the negative impacts of constructing new facilities as well as the small size and scope of the project, all action alternatives will have neutral - negligible effects to mammals.

6.3.3 Effects to Forage Fish
Alternative A
There will be no change to current conditions under Alternative A.

Alternative B - E:
Removal of the cabin and septic system and replanting of a portion of the cleared area at the Mellus Cabin site would reduce the amount of water being added to the top of the bluff and provide more natural erosion of the bluff face. This should allow for a more natural nutrient deposition cycle within the nearshore. Natural nutrient deposition is beneficial for forage fish spawning. Since there are no forage fish spawning sites within the vicinity of this portion of the bluff, there will most likely be no effect.

Overall Effects
There will be no effect to forage fish and anadromous fish under all alternatives.

6.3.4 Effects to Threatened, Endangered, and Sensitive Species
Listed species receive special consideration in terms of refuge management. Federally listed species are trust resources that require additional consultation whenever an activity conducted by or permitted by the Refuge may have an effect on these species or their habitats.

All Alternatives

Threatened Puget Sound Chinook and Hood Canal Summer Chum most likely use the nearshore especially on the bay side of Dungeness Spit. None of the alternatives have a large enough effect on the nearshore habitat to have a positive or negative effect on these species.

Overall Effects
There will be no effect to Threatened and Endangered species under all alternatives.

6.4 Effects to Cultural and Paleontological Resources

6.4.1 Effects to Cultural Resources

The National Historic Preservation Act (NHPA) of 1966, as amended, establishes the Federal government's policy on historic preservation and the programs through which that policy is implemented. Historic preservation is defined as the protection, rehabilitation, restoration, and reconstruction of sites, buildings, structures, and objects significant in American history, architecture, engineering, and archaeology.

A Request for Cutural Resources Compliance was requested for the demolition of the Mellus Cabin and the site selected as the preferred alternative. Upon receipt of the compliance findings, the Refuge will alter demolition and/or construction using appropriate procedures and protocols to protect any and all cultural resources. Whenever possible, resources would be avoided through relocating or redesigning facilities.

Overall Effects
Compliance with cultural resource investigation protocol will be obtained prior to conducting ground disturbing actions.

6.4.2 Effects to Paleontological Resources

Paleontological resources, like cultural resources, are found above and below the surface of the ground. Also, similar to cultural resources, they are impacted by ground-disturbing activities. Under all alternatives, the collection and curation of paleontological resources would be managed under the Department of the Interior's Museum Property program and the Paleontological Resources Protection Act (PRPA). Negative impacts to paleontological resources would be minimized by conducting a systematic survey prior to any ground-disturbing activity and mitigating potential negative effects. Consequently, the overall effects to paleontological resources across all alternatives are neutral.

6.5 Social Effects

The Social Effects section assesses how management actions under each alternative could affect quality opportunities for each of the Refuge System's priority public uses currently occurring or proposed for Dungeness NWR (i.e., wildlife observation, photography, interpretation, environmental education, and fishing). The section also includes an assessment of the change in refuge user numbers expected under each of the alternatives.

6.5.1 Changes in Visitation

Due to visitation trends, a growing visitor presence on the Refuge can be expected in the future under all alternatives. None of the alternatives should have any impact on long term visitation trends. All Alternatives would have some minimal short-term impacts on visitation during demolition of the Mellus Cabin site. Alternatives D and E may have a slightly longer term impact since construction

of the new facility may require use of Refuge parking areas and trails. Impacts would subside after construction is complete. Since More information on general visitation trends can be found in the 2013 Dungeness National Wildlife Refuge Comprehensive Conservation Plan.

Overall Effect
There would be negligible short-term and long-term effects under Alternatives B, and C. There would be minor negative short-term effects and negligible long-term effects under Alternatives C and D.

6.5.2 Effects to Public Uses

Alternative A: There will be no change to current conditions under Alternative A.

Alternative B and C: There will be a minor positive long-term benefit to wildlife photography and viewing activities through the removal of structures and restoration of native habitat. There will be some negative short-term effects to all users of the main trail during demolition of the Mellus Cabin site. Given the short duration of these activities and the ability to reroute Refuge visitors, these impacts are expected to be negligible.

Alternatives D and E: There will be a minor positive long-term benefit to wildlife photography and viewing activities through the removal of structures and restoration of native habitat. However, this benefit is counteracted by removal of forest habitat for construction of the new refuge quarters. There will be a short-term negative impact to Refuge users during demolition and construction activities through displacement of wildlife and disruption of visitor access. Construction of facilities adjacent to wildlife viewing areas will impact Refuge users for a longer period than impacts under Alternatives B and C. Since this impact will be short-lived and will subside after construction is complete, the impact is anticipated to be minor.

Overall Effects
There are expected to be minor positive long-term effects under all action alternatives. Negligible short-term negative impacts to wildlife dependent recreation can be expected under Alternatives B and C. Minor negative short-term impacts are anticipated under Alternatives D and E.

6.5.3 Effects to Illegal Uses

Illegal uses of the Refuge occur to varying degrees and include pets, bicycles, resource collecting, fires, discharging firearms, closed area and after hours trespass including camping, kite flying fireworks, ball playing and Frisbee throwing. Even though volunteers do not enforce Refuge regulation, they presence can increase compliance through information dispersal and simply by being present.
Alternative A: There will be no change to current conditions under Alternative A.

Alternative B and C: The removal of quarters from the sight of visitors could potentially produce a minor long-term negative impact to regulatory compliance.

Alternatives D and E: Since the Refuge quarters would be constructed adjacent to visitor use areas, there is likely to be no effect on illegal refuge uses.

Overall Effects

Since volunteers do not enforce Refuge regulation there is likely to be little to no effect on illegal uses of the Refuge under all alternatives. However, reduction of the visual presence of volunteer quarters under Alternatives B and C may create a small negative effect.

6.5.7 Effects to Human Health

Alternative A: There will be no change to current conditions under Alternative A.

Alternatives B, C, D, and E: The impacts to human health through air quality impacts of restoring and/or removing trees, and impacts from the use of herbicides to restore native vegetation are expected to be negligible.

Overall Effects

Impacts to human health are expected to be negligible under all action alternatives.

6.5.8 Effects to Environmental Justice

The concept of environmental justice has been around since the early 1990s and arose from a need to ensure that negative environmental activities from industry or government projects would not endanger local communities. The U.S. Environmental Protection Agency (USEPA) oversees environmental justice compliance and defines environmental justice as: "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies" (USEPA 2010). All federal actions must address and identify, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations, low-income populations, and Indian Tribes in the United States.

Since implementation of any of the alternatives is expected to only impact the area immediately surrounding the facilities, there is little risk of disproportionate adverse effects on human health or economics to low income or minority groups. Therefore, negligible effects related to environmental justice are anticipated under all alternatives

6.6 Economic Effect

6.6 Economic Effects

Due to the small footprint of the project, the short construction/demolition timeline, and the lack of effects across all categories, it is highly unlikely that any of the alternatives would have any economic effect.

Appendix A. Sample Floor Plans and Pictures

The following floor plan and photograph are representations of the type of building that will be utilized as quarters on Dungeness NWR. The actual model may vary slightly.

Figure A-1. Sample Floor Plan

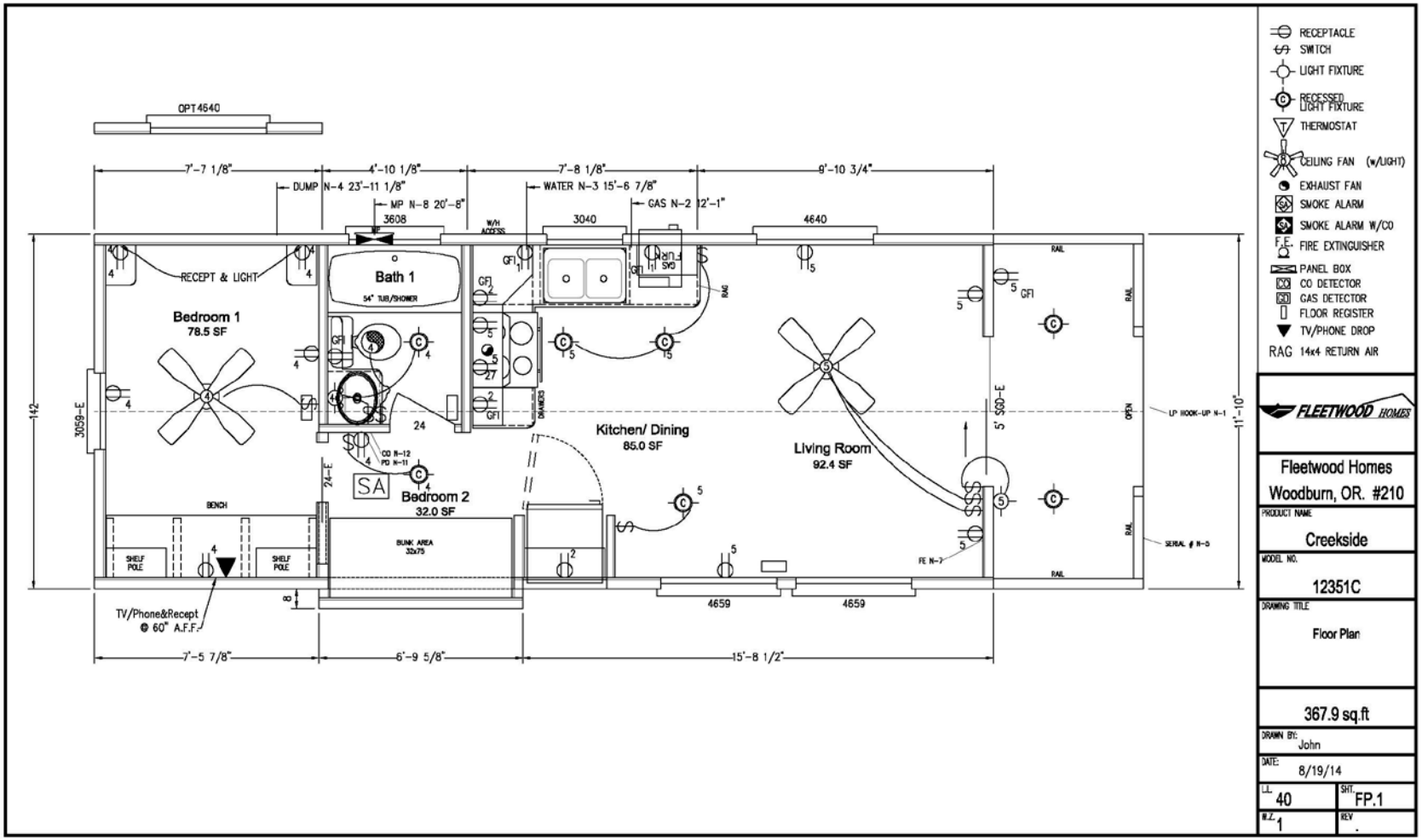

Figure A-2. Sample Photograph

Figure A-3. Sample Photograph

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