Appendices

Appendices

Appendix A: Humboldt Bay NWR Complex CCP Glossary

Humboldt Bay NWR Complex CCP Glossary

Adaptive Management—The rigorous application of management, research, and monitoring to gain information and experience necessary to assess and modify management activities. A process that uses feedback from refuge research and monitoring and evaluation of management actions to support or modify objectives and strategies at all planning levels.

Algae (plural of alga)—Any of numerous groups of chlorophyll-containing, mainly aquatic organisms ranging from microscopic single-celled forms to large multicellular forms, distinguished from plants by the absence of true roots, stems, and leaves and by a lack of nonreproductive cells in the reproductive structures.

Alliance (plant alliance)—A uniform group of plant associations sharing one or more dominant or diagnostic plant species which, are found in the uppermost strata of the vegetation.

Alkalinity—Refers to the extent to which water or soils contain soluble mineral salts. Waters with a pH greater than 7.4 are considered alkaline.

Allelopathy—The inhibition of growth in one species of plants by chemicals produced by another species.

Alluvial—Made of clay, sand, or dirt washed by flowing water.

Alternatives—Different sets of objectives and strategies or means of achieving refuge purposes and goals, helping fulfill the Refuge System mission, and resolving issues. (1) A reasonable way to fix the identified problem or satisfy the stated need. (40 CFR 150.2) (2) Alternatives are different means of accomplishing refuge purposes and goals and contributing to the System mission (Draft Service Manual 602 FW 1.5).

Ammocoetes—Juvenille lampreys.

Anadromous—A lifecycle of fish that involves migrating up rivers from the sea to breed in fresh water followed by young returning to the sea until reaching maturity.

Animal Unit Month (AUM)—The amount of forage necessary to maintain one 1,000-pound animal for one month.

Aquatic—Pertaining to water, in contrast to land. Living in or upon water.

Aquatic Habitat—The physical, chemical, and vegetative features that occur within the water of lakes, ponds, reservoirs, rivers, irrigation canals, and other bodies of water.

Artifact—An object made by humans; usually in reference to primitive tools, vessels, weapons, etc.

Biodiversity (biological diversity)—Refers to the full range of variability within and among biological communities, including genetic diversity, and the variety of living organisms, assemblages of living organisms, and biological processes. Diversity can be measured in terms of the number of different items (species, communities) and their relative abundance, and it can include horizontal and vertical variability. The variety of life, including the variety of living organisms, the genetic differences among them, and the communities in which they occur.

Biological Integrity—Biotic composition, structure, and functioning at the genetic, organism, and community levels consistent with natural conditions, including the natural biological processes that shape genomes, organisms, and communities.

Birds of Conservation Concern—A U.S. Fish and Wildlife Service designation given to bird species (beyond those listed as endangered or threatened) that represent our highest conservation priorities and draw attention to species in need of conservation action.

California Current—The ocean current flowing southward along the western coast of the United States to northern Baja California.

California Species of Special Concern—A California Department of Fish and Game designation given to certain vertebrate species because declining population levels, limited ranges, and/or continuing threats have made them vulnerable to extinction.

Carnivore—An animal that kills and eats other animals.

Categorical Exclusion (CE, CX, CATEX, CATX)—A category of actions that do not individually or cumulatively have a significant effect on the human environment and have been found to have no such effect in procedures adopted by a Federal agency pursuant to the National Environmental Policy Act (40 CFR 1508.4).

Cetacean—Any of various aquatic, chiefly marine mammals of the order Cetacea, including the whales, dolphins, and porpoises, characterized by a nearly hairless body, anterior limbs modified into broad flippers, vestigial posterior limbs, and a flat notched tail.

Closed-cone pines—Pine species that rely upon fire to open their cones and release seeds.

Community—The combined populations of all organisms in a given area, and their interactions. For example, the frogs, fish, algae, cattails, and lily pads in a backyard pond make up a community.

Compatible Use—A wildlife-dependent recreational use or any other use of a refuge that, in the sound professional judgment of the Director, will not materially interfere with or detract from the fulfillment of the Mission of the System or the purposes of the refuge (Draft Service Manual 603 FW 3.6).

Comprehensive Conservation Plan (CCP)—A document that describes the desired future conditions of the refuge or planning unit; and provides long-range guidance and management direction to accomplish the purposes of the refuge, helps fulfill the mission of the Refuge System; maintains and, where appropriate, restores the ecological integrity of each refuge and the Refuge System; helps achieve the goals of the National Wilderness Preservation System; and meets other mandates.

Creching—The formation of groups of chicks from two or more broods in or adjacent to the breeding colony.

Crustacean—any of various predominantly aquatic arthropods of the class Crustacea, including lobsters, crabs, shrimps, and barnacles, characteristically having a segmented body, a chitinous exoskeleton, and paired, jointed limbs.

Cryptogamic Mat—short dune communities made up of members of a formerly recognized taxonomic group that included all seedless plants and plantlike organisms, such as mosses, algae, ferns, and fungi.

Cultural Resource—The physical remains of human activity (artifacts, ruins, burial mounds, petroglyphs, etc.) and conceptual content or context (as a setting for legendary, historic, or prehistoric events, such as a sacred area of native peoples) of an area. It includes historical, archaeological and architectural significant resources.

Cultural Resource Inventory—A professionally conducted study designed to locate and evaluate evidence of cultural resources present within a defined geographic area. Inventories may involve various levels, including background literature search, comprehensive field examination to identify all exposed physical

manifestations of cultural resources, or sample inventory to project site distribution and density over a larger area. Evaluation of identified cultural resources to determine eligibility for the National Register follows the criteria found in 36 CFR 60.4 (Service Manual 614 FW 1.7).

Cultural Resource Overview—A comprehensive document prepared for a field office that discusses, among other things, its prehistory and cultural history, the nature and extent of known cultural resources, previous research, management objectives, resource management conflicts or issues, and a general statement on how program objectives should be met and conflicts resolved. An overview should reference or incorporate information from a field offices background or literature search described in Section VIII of the Cultural Resource Management Handbook (Service Manual 614 FW 1.7).

Dike—An embankment of earth and rock built to prevent floods.

Dune—A hill or ridge of wind-blown sand.

Ecosystem—The sum of all interacting parts of the environment and associated ecological communities within a particular area; an ecological system. Many levels of ecosystems have been recognized. Very few, if any ecosystems are self-contained; most influence, or are influenced by, components or forces outside the system. For administrative purposes, we have designated 53 ecosystems covering the United States and its possessions. These ecosystems generally correspond with watershed boundaries, and their sizes and ecological complexity vary.

Effect—A change in a resource, caused by a variety of events including project attributes acting on a resource attribute (direct), not directly acting on a resource attribute (indirect), another project attributes acting on a resource attribute (cumulative), and those caused by natural events (e.g., seasonal change).

Emergent Vegetation—Rooted, aquatic plants that have most of their vegetative (nonroot) parts above water.

Endemic Species—Plants or animals that occur naturally in a certain region and whose distribution is relatively limited to a particular locality.

Endangered Species—Any species that is in danger of extinction throughout all or a significant portion of its range and listed as such by the Secretary of the Interior in accordance with the Endangered Species Act of 1973. Endangered species are afforded protection under the Act as amended and under various State laws for State-listed species.

Environmental Assessment (EA)—A concise public document, prepared in compliance with the National Environmental Policy Act, that briefly discusses the purpose and need for an action, alternatives to such action, and provides sufficient evidence and analysis of impacts to determine whether to prepare an environmental impact statement or finding of no significant impact (40 CFR 1508.9).

Environmental Health—Abiotic composition, structure, and functioning of the environment consistent with natural conditions, including the natural abiotic processes that shape the environment.

Epifauna—Benthic fauna that live on a surface, such as the sea floor, other organisms, or objects.

Epiphyte—A plant that grows on another plant upon which it depends for mechanical support but not for nutrients.

Eradicate—To effectively eliminate a non-native organism from a defined area. It is acknowledged that weeds can be reintroduced (including by natural dispersal) and that, as the Office of Technology Assessment states in "Harmful Non-Indigenous Species of the United States (1993), "some continued unintentional introductions are inevitable...perfect screening, detection, and control are technically impossible and will remain so in the foreseeable future." Our use of the term "eradication" suggests that the goal of the effort is to eliminate a species regionally, such that only continued screening is needed to detect and remove minor missed, re-established, or re-introduced occurrences. This contrasts with our use of the word "control" where the goal of the effort is to reduce the population to a level that requires minimal maintenance, knowing that continued dispersal from adjacent populations is likely.

Estuarine—Of, relating to, or found in an estuary.

Estuarine Wetland—Deepwater and wetland areas that are usually semi-enclosed with an opening to the ocean and in which there is some mixing of fresh and sea water.

Estuary—The part of the wide lower course of a river where its current is met by the tides.

EuroAmerican—A U.S. citizen or resident of European descent.

Eutrophic—Having waters rich in mineral and organic nutrients that promote a proliferation of plant life, especially algae, which reduces the dissolved oxygen content and often causes the extinction of other organisms. Used of a lake or pond.

Eutrophication—The process of becoming eutrophic.

Evapotranspiration—The collective processes by which water is transferred from the surface of the earth, including from the soil and the surface of water-bodies (through evaporation) and from plants (through transpiration).

Evolutionarily Significant Unit (ESU)—A population or group of populations inhabiting a defined geographical area that comprises a unique segment of the species; a distinct population, reproductively isolated from other conspecific populations and is an important evolutionary legacy of the species.

Exotic and Invading Species (Noxious Weeds)—Plant species designated by Federal or State law as generally possessing one or more of the following characteristics: aggressive or difficult to manage; parasitic; a carrier or host of serious insects or disease; or nonnative, new, or not common to the United States, according to the Federal Noxious Weed Act (PL 93-639), a noxious weed is one that causes disease or has adverse effects on man or his environment and therefore is detrimental to the agriculture and commerce of the Unite States and to the public health.

Eyrie (aerie)—The nest of a bird, such as an eagle, built on a cliff or other high place.

Finding of No Significant Impact (FONSI)—A document prepared in compliance with the National Environmental Policy Act, supported by an environmental assessment, that briefly presents why a Federal action will have no significant effect on the human environment and for which an environmental impact statement, therefore, will not be prepared (40 CFR 1508.13).

Flyway—A route taken by migratory birds between their breeding grounds and their wintering grounds. Four primary migration routes have been identified for birds breeding in North America: the Pacific, Central, Mississippi, and Atlantic Flyways.

Foraging—The act of feeding; another word for feeding.

Forbs—Herbaceous dicotyledonous plants.

Fragmentation—The process of reducing the size and connectivity of habitat patches.

Fungi (plural of fungus)—Any of numerous organisms of the kingdom Fungi, which lack chlorophyll and vascular tissue and range in form from a single cell to a body mass of branched filamentous hyphae that often produce specialized fruiting bodies (ex. mushrooms, puff balls, etc.). The kingdom includes the yeasts, molds, smuts, and mushrooms.

Gastropod—Any of various mollusks of the class Gastropoda, such as the snail, slug, or limpet, characteristically having a single, usually coiled shell or no shell at all, a ventral muscular foot for locomotion, and eyes and feelers located on a distinct head.

Geophyte—bulb plants.

GIS—Geographic Information System. Refers to such computer mapping programs as ArcView, ArcInfo, ERDAS, etc.

Goal—A descriptive, open-ended, and often broad statement of desired future conditions that conveys a purpose but does not define measurable units (Draft Service Manual 620 FW 1.5).

Grain—A single, hard seed of a cereal grass.

Habitat—Suite of existing environmental conditions required by an organism for survival and reproduction. The place where an organism typically lives.

Hemiparasitic Plant—A plant, such as mistletoe, that obtains some nourishment from its host but also photosynthesizes.

Hydrobasin—A major hydrological drainage basin.

Integrated Pest Management (IPM)—Methods of managing undesirable species, such as weeds, including education; prevention, physical or mechanical methods or control; biological control; responsible chemical use; and cultural methods.

Invasive Species—An alien (non-native) species whose introduction does or is likely to cause economic or environmental harm or harm to human health

Invertebrate—Animals that do not have backbones. Included are insects, spiders, mollusks (clams, snails, etc.), and crustaceans (shrimp, crayfish, etc.).

Irrigation Drainwater—Ideally, subsurface water which flows from irrigated land and generally transports higher concentrations of dissolved salts than the water applied to the land.

Irrigation Return Flow—Water which reaches surface drainage by overland flow or through groundwater discharge as a result of applied or natural irrigation.

Issue—Any unsettled matter that requires a management decision, e.g., an initiative, opportunity, resource management problem, threat to the resources of the unit, conflict in uses, public concern, or the presence of an undesirable resource condition.

Levee—An embankment raised to prevent a river from overflowing.

Lichens—A fungus that grows symbiotically with algae, resulting in a composite organism that characteristically forms a crustlike or branching growth on rocks or tree trunks.

List 1B Plants (California Native Plant Society)—Plants that are rare, Threatened or Endangered in California and elsewhere.

List 4 Plants (California Native Plant Society)—Plants of limited distribution, often referred to as a plant watch list.

Marsh—An area of soft, wet, low-lying land, characterized by grassy vegetation and often forming a transition zone between water and land.

Mean high water (tide)—The average height of all high waters recorded at a given place over a 19-year period.

Mean low water (tide)—The average height of all low waters recorded at a given place over a 19-year period.

Memorandum of Understanding—A legal document outlining the terms and details of an agreement between parties, including each parties requirements and responsibilities.

Midden site—A mound or deposit containing shells, animal bones, and other refuse that indicates the site of a human settlement.

Mitigation—To avoid or minimize impacts of an action by limiting the degree or magnitude of the action; to rectify the impact by repairing, rehabilitating, or restoring the affected environment; to reduce or eliminate the impact by preservation and maintenance operations during the life of the action.

Mycoheterotrophs—Orchids and other species that are mutualists with mycorrhizal fungi; these plants derive their energy from fungi that in turn get their energy from another vascular plant.

National Environmental Policy Act (NEPA)—An act which encourages productive and enjoyable harmony between humans and their environment, to promote efforts that will prevent or eliminate damage to the environment and atmosphere, to stimulate the health and welfare of humans. The act also established the Council on Environmental Quality (CEQ). Requires all agencies, including the Service, to examine the environmental impacts of their actions, incorporate environmental information, and use public participation in the planning and implementation of all actions. Federal agencies must integrate NEPA with other planning requirements, and prepare appropriate NEPA documents to facilitate better environmental decision making (from 40 CFR 1500).

National Wildlife Refuge (Refuge or NWR)—A designated area of land or water or an interest in land or water within the system, including national wildlife refuges, wildlife ranges, wildlife management areas, waterfowl production areas, and other areas (except coordination areas) under the Service jurisdiction for the protection and conservation of fish and wildlife. A complete listing of all units of the Refuge System may be found in the current "Report of Lands Under Control of the U.S. Fish and Wildlife Service."

National Wildlife Refuge System, Refuge System, or **System**—Various categories of areas that are administered by the Secretary for the conservation of fish and wildlife, including species that are threatened with extinction; all lands, waters, and interest therein administered by the Secretary as wildlife refuges; areas for the protection and conservation of fish and wildlife that are threatened with extinction; wildlife ranges; game ranges; wildlife management or waterfowl production areas.

Native Species—Species that normally live and thrive in a particular ecosystem.

Nekton—The collection of marine and freshwater organisms that can swim freely and are generally independent of currents, ranging in size from microscopic organisms to whales.

No Action Alternative—An alternative under which existing management would be continued.

Objective—A concise statement of what we want to achieve, how much we want to achieve, when and where we want to achieve it, and who is responsible for the work. Objectives derive from goals and provide the basis for determining strategies, monitoring refuge accomplishments, and evaluating the success of strategies. Make objectives attainable, time-specific, and measurable.

Oology—The branch of zoology that deals with the study of eggs, especially birds' eggs.

Ornithology—The branch of zoology that deals with the study of birds.

Ozone—Ozone is an invisible pollutant formed by chemical reactions involving nitrogen oxides, reactive hydrocarbons and sunlight. It is a powerful respiratory irritant that can cause coughing, shortness of breath, headaches, fatigue and lung damage, especially among children, the elderly, the ill and people who exercise outdoors.

pH—An index of acidity/alkalinity of a solution, being an expression of concentration of hydrogen ions.

Pacific Decadal Oscillation—The Pacific Decadal Oscillation (PDO) is a pattern of Pacific climate variability that shifts phases on a multi-decadal time scale, usually about 20 to 30 years. The PDO is detected as warm or cool surface waters in the Pacific Ocean, north of 20° N. During a "warm", or "positive", phase, the west Pacific becomes cool and part of the eastern ocean warms; during a "cool" or "negative" phase, the opposite pattern occurs.

Palustrine—being, living, or thriving in a marsh.

Palustrine Wetland—All non-tidal wetlands dominated by trees, shrubs, and persistent emergent vegetation.

Particulate matter—Particulate matter is the fine mineral, metal, soot, smoke and dust particles suspended in the air. For health reasons, regulators are most concerned with inhalant particulate matter less than 10 microns in diameter (PM10), which can permanently lodge in the deepest, most sensitive areas of the lungs, and cause respiratory and other health problems.

Pelagic—Living in open oceans or seas rather than waters adjacent to land or inland waters.

Piscivorous—Habitually feeding on fish; fish-eating.

Pinniped—Of or belonging to the Pinnipedia, a suborder of carnivorous aquatic mammals that includes the seals, walruses, and similar animals having finlike flippers as organs of locomotion.

Plant Community—An assemblage of species populations of plants in a particular area at a particular point in time; the biological part of an ecosystem as distinct from its physical environment. The plant community of an area can change over time due to disturbance (e.g., fire) and succession.

Polychaete—Any of various annelid worms of the class Polychaeta, including mostly marine worms such as the lugworm, and characterized by fleshy paired appendages tipped with bristles on each body segment.

Population—All the members of a single species coexisting in one ecosystem at a given time.

Preferred Alternative—This is the alternative determined (by the decision maker) to best achieve the Refuge purpose, vision, and goals; contributes to the Refuge System mission, addresses the significant issues; and is consistent with principles of sound fish and wildlife management. The Service's selected alternative at the Draft CCP stage.

Prescribed Fire—The skillful application of fire to natural fuels under conditions of weather, fuel moisture, soil moisture, , etc., that allows confinement of the fire to a predetermined area and produces the intensity of heat and rate of spread to accomplish planned benefits to one or more objectives of habitat management, wildlife management, or hazard reduction.

Priority Public Uses—Compatible wildlife-dependent recreation uses (hunting, fishing, wildlife observation and photography, and environmental education and interpretation).

Propagules—Any of various usually vegetative portions of a plant, such as a bud or other offshoot, that aid in dispersal of the species and from which a new individual may develop.

Proposed Action—The Service's proposed action for Comprehensive Conservation Plans is to prepare and implement the CCP.

Public Involvement—A process that offers impacted and interested individuals and organizations an opportunity to become informed about, and to express their opinions on Service actions and policies. In the process, these views are studied thoroughly and thoughtful consideration of public views is given in shaping decisions for refuge management.

Public Scoping—See public involvement.

Purposes of the Refuge—"The purposes 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." For refuges that encompass congressionally designated wilderness, the purposes of the Wilderness Act are additional purposes of the refuge.

Raptor—A bird of prey, such as a hawk, eagle, or owl.

Redoximorphic Features—Colors in the soil that indicate water is seasonally present at the level the features are found.

Refuge—Short form of National Wildlife Refuge.

Refuge Operating Needs System (RONS)—The Refuge Operating Needs System is a national database that contains the unfunded operational needs of each refuge. We include projects required to implement approved plans and meet goals, objectives, and legal mandates.

Salmonid—Of, belonging to, or characteristic of the family Salmonidae, which includes the salmon, trout, and whitefish.

Sand—A sedimentary material, finer than a granule and coarser than silt, with grains between 0.06 and 2.0 millimeters in diameter.

Salinity—An expression of the amount of dissolved solids in water.

Salt Marsh—Low coastal grassland frequently overflowed by the tide.

Seabird—A bird, such as a petrel or albatross, that frequents the ocean, especially far from shore.

Shorebirds—Long-legged birds, also known as waders, belonging to the Order Charadriiformes that use shallow wetlands and mudflats for foraging and nesting.

Silt—A sedimentary material consisting of very fine particles intermediate in size between sand and clay.

Siltation—The process of becoming covered with silt.

Shorebird—Any of various birds, such as the sandpiper, plover, or snipe, that frequent the shores of coastal or inland waters.

SLAMM—Sea Level Affecting Marsh Management

Sound Professional Judgment—A finding, determination, or decision that is consistent with principles of sound fish and wildlife management and administration, available science and resources, and adherence to the requirements of the Refuge Administration Act and other applicable laws.

Species—A distinctive kind of plant or animal having distinguishable characteristics, and that can interbreed and produce young. A category of biological classification.

Step-Down Management Plan—A plan that provides specific guidance on management subjects (e.g., habitat, public use, fire, safety) or groups of related subjects. It describes strategies and implementation schedules for meeting CCP goals and objectives.

Strategy—A specific action, tool, or technique or combination of actions, tools, and techniques used to meet unit objectives (Draft Service Manual 602 FW 1.5).

Stratigraphy—The study of rock strata, especially the distribution, deposition, and age of sedimentary rocks.

Suffrutescent—Having a stem that is woody only at the base; somewhat shrubby.

Tidal Prism—The difference between the mean high-water volume and the mean low-water volume of an estuary.

Threatened Species—Any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range, and one that has been designated as a threatened species in the Federal Register by the Secretary of the Interior. Threatened species are afforded protection under the Endangered Species Act of 1973, as amended.

Trust Resources—Those resources for which the Service has been given specific responsibilities under Federal law. These include migratory birds, interjurisdictional fishes (fish species that may cross state lines), federally listed threatened or endangered species, some marine mammals, and lands owned by the Service.

Upland—An area where water normally does not collect and where water does not flow on an extended basis. Uplands are non-wetland areas.

Vision Statement—A concise statement of what the planning unit should be, or what we hope to do, based primarily upon the Refuge System mission and specific refuge purposes, and other mandates. We will tie the vision statement for the refuge to the mission of the Refuge System; the purpose(s) of the refuge; the maintenance or restoration of the ecological integrity of each refuge and the Refuge System; and other mandates.

Wading Bird—A long-legged bird, such as a crane, heron, or stork, that frequents shallow water, especially in search of food.

Waterfowl—A group of birds that include ducks, geese, and swans (belonging to the order Anseriformes).

Watershed—The entire land area that collects and drains water into a river or river system.

Wetland—Lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this classification wetlands must have one or more of the following three attributes: (1) at least periodically, the land supports predominantly hydrophytes; (2) the substrate is predominantly undrained hydric soil; and (3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of the year (from USFWS Classification of Wetlands and Deepwater Habitats of the United States).

Wilderness Review—The process we use to determine if we should recommend Refuge System lands and waters to Congress for wilderness designation. The wilderness review process consists of three phases: inventory, study, and recommendation. The inventory is a broad look at the refuge to identify lands and waters that meet the minimum criteria for wilderness. The study evaluates all values (ecological, recreational, cultural), resources (e.g., wildlife, water, vegetation, minerals, soils), and uses (management and public) within the Wilderness Study Area. The findings of the study determine whether or not we will recommend the area for designation as wilderness.

Wildfire—A free-burning fire requiring a suppression response; all fire other than prescribed fire that occurs on wildlands (Service Manual 621 FW 1.7).

Wildlife—All nondomesticated animal life; included are vertebrates and invertebrates.

Wildlife-Dependent Recreational Use—"A use of a refuge involving hunting, fishing, wildlife observation and photography, or environmental education and interpretation." These are the six priority public uses of the Refuge System as established in the National Wildlife Refuge System Administration Act, as amended. Wildlife-dependent recreational uses, other than the six priority public uses, are those that depend on the presence of wildlife. We also will consider these other uses in the preparation of refuge CCPs; however, the six priority public uses always will take precedence.

Appendix B: Visitor Services Plan

VISITOR SERVICES PLAN

Humboldt Bay National Wildlife Refuge Complex

November 2008

Region 8
U.S. Fish and Wildlife Service

Table Of Contents

Summary

The purpose of the Humboldt Bay National Wildlife Refuge Complex's (refuge) visitor services program is to foster understanding and instill in refuge visitors appreciation of fish, wildlife, and plants and their conservation. This will be accomplished by providing the public with safe, high-quality, appropriate, and compatible wildlife-dependent recreation and education programs and activities. In 1997 Congress passed the National Wildlife Refuge Improvement Act (Improvement Act) which clearly states that on national wildlife refuges, wildlife comes first. The 1997 Improvement Act also identified six wildlife-dependent priority public use activities and programs that are compatible with the mission of the National Wildlife Refuge System. These uses include: environmental education and interpretation, wildlife photography, wildlife observation, hunting and fishing.

This Visitor Services Plan (VSP) was prepared based on these guidelines. With the adoption and implementation of the Comprehensive Conservation Plan (CCP) and this step-down plan, all visitor service activities and programs on the refuge would be in conformance with national guidelines and would ensure that all visitor activities are compatible with the refuges' overarching wildlife mission and purposes. During the winter of 2006 a Visitor Services Review was conducted for the refuge. The Visitor Services Review evaluated the status of all refuge visitor services programs at that time and suggested changes and guidance that were incorporated into this document.

The purpose of the VSP is to establish priorities and identify improvements which will guide the refuge visitor services program over the next fifteen years. A visitor services goal, objectives and strategies have been identified within the CCP (Chapter 3 of the CCP). A Waterfowl Hunt Plan and a Sport Fishing Plan have also been prepared (Appendices to the CCP). This VSP addresses all compatible wildlife-dependent recreational uses on the refuge including environmental education and interpretation, wildlife photography, wildlife observation (which includes non-motorized boating), hunting and fishing.

Visitors enjoying the Shorebird Loop Trail at Humboldt Bay NWR's Salmon Creek Unit.
Photo: USFWS

Introduction
See Chapter 1 of the CCP

Brief History
See Chapter 1 of the CCP

Significant Features
See Chapter 1 of the CCP

Primary Refuge Resource Management Goals and Objectives
See Chapter 5 of the CCP

Local Setting

Community Description
See Chapter 3 of the CCP

Local Economy
See Chapter 3 of the CCP

Demographics
See Chapter 3 of the CCP

Visitor Data
See Chapter 3 of the CCP

Travel Links
The major transportation route in the vicinity of the refuge is Highway 101. Many small paved county roads provide for local transportation. These, and Highway 101, provide access to refuge visitor contact stations and parking lots. There are currently no alternative transportation systems that provide access to refuges, however the refuge is a participant in planning for a system of regional biking and walking trails.

Visitor Services Opportunities (off-refuge)
Eel River Wildlife Area (California Department of Fish and Game)
The Eel is California's third largest river and carries ten percent of California's yearly runoff. The Eel is important to coastal dunes because it carries tremendous amounts of sediments that form the building materials of dunes. The Eel is federally classified as a wild and scenic river. The Eel River delta can be explored from Crab County Park and the Eel River Wildlife Area, accessed four miles west of Loleta, at the end of Cannibal Island Road.

Eel River Wildlife Area is home to the threatened western snowy plover. In the Wildlife Area vehicles are restricted to the wave slope (wet sand) and the back dune road. Dogs must be on a leash between March 1st and September 30th.

South Spit Cooperative Management Area (Bureau of Land Management, California Department of Fish and Game, Humboldt County, US Fish and Wildlife Service)
Located at the end of Table Bluff Road 5 miles west of Loleta, the area is open from one hour before sunrise until one hour after sunset, with earlier opening during waterfowl season. Equestrian use is limited to the west side of jetty road and vehicle access is restricted to the waveslope, not to exceed 15 miles per hour. The south spit is also home to the threatened western snowy plover, and has restrictions for vehicles and dogs.

Headwaters Forest Reserve
On March 1, 1999, the Headwaters Forest and surrounding lands, totaling 7,500 acres in central Humboldt County, were acquired from private owners by the U.S. Department of the Interior, Bureau of Land Management (BLM) and the California Department of Fish and Game (CDFG). The Headwaters Forest Reserve is set aside to protect and preserve the ecological and wildlife values in the area, particularly the

stands of old-growth redwoods that provide habitat for the threatened marble murrelet, and the stream systems that provide habitat for threatened Coho salmon. Public access is available to the north end of the reserve along the Elk River County Road, approximately six miles southeast of Eureka. To get there; take Highway 101 to the Elk River Road exit. Turn right on Elk River Road. The county road ends at the reserve boundary where signs provide information for visitors. A parking area is available inside the reserve.

Elk River Wildlife Sanctuary (California Department of Fish and Game)
The Elk River is Humboldt Bay's largest tributary and is a spawning ground for salmon, steelhead and coastal cutthroat trout. A sand spit began to form at the river's mouth in 1930 and now extends over a mile into Humboldt Bay. A parking area off Hilfiker Lane, west of Highway 101, provides access to trails through 100 acres of restored riparian woodland, freshwater marsh, saltmarsh, and dunes. Please stay on trails to avoid impacts to endangered plants and sensitive resources.

Fay Slough Wildlife Area (California Department of Fish and Game)
This 484 acre wildlife management area is located 1.5 miles north east of Eureka, off Hwy 101. This previously grazed land has been restored to coastal and seasonal wetlands. Egrets and herons are now common in this riparian habitat. The site is open to hunting during waterfowl season and wildlife observation year round.

Mad River Wildlife Area (California Department of Fish and Game)
Located a half mile west of Arcata off of Samoa Blvd., this area consists of 547 acres of agricultural land and restored coastal wetland, with many sloughs. Egrets, herons, mink and weasel are found here. Mad River Wildlife area is open to hunting during waterfowl season and wildlife observation year round.

Arcata Marsh and Wildlife Sanctuary (City of Arcata)
The City of Arcata's unique wastewater treatment facility, marsh, and wildlife sanctuary attracts approximately 150,000 visitors per year. Arcata's wastewater treatment plant is an example of a community's involvement in environmental politics, innovative uses of land, and applications of appropriate technology in a small urban community. The Arcata Wastewater Treatment Plant combined with the Arcata Marsh and Wildlife Sanctuary has multiple uses, including wastewater treatment, recreation, wildlife habitat, education, and research.

Samoa Dunes (Bureau of Land Management)
This 300 acre park allows visitors to take advantage of a wide variety of recreational activities, including hiking, surfing, fishing, sightseeing, beachcombing, off-highway vehicle (OHV) use, picnicking, and birdwatching. When walking in the recreation area visitors should be aware of off road vehicle riding areas.

Humboldt Coastal Nature Center (Friends of the Dunes)
Plans are currently underway to transform the ocean and bay view property formerly known as the Stamps House into a "gateway to the dunes." Featuring an interpretive nature center, restrooms, ample parking, and a marked trail system, the Humboldt Coastal Nature Center will provide the community with an easy point of entry to the coastlands and dune trails that will connect to Ma-le'l and Lanphere Dunes to the north, and Manila Community Services Dunes to the south. The linked trail system will provide visitors with access to approximately 1,000 acres of coastal dune habitats, and the nature center, and an adjacent loop trail, will be wheelchair accessible.

Boating and non-motorized boating opportunities in Humboldt Bay
Recreational boating opportunities are available for watercraft ranging from the smallest canoes and kayaks to the largest sailboats and yachts. Improved non-motorized boat launching facilities are located throughout Humboldt Bay. Canoes and kayaks are popular for exploring the salt marshes that ring Humboldt Bay. In addition to the improved non-motorized boat launching facilities, there are several launch areas that are appropriate for canoes and kayaks around Humboldt Bay. A public canoe/kayak launch area is located at Woodley Island Marina. In addition, canoe and kayak rentals, sales and lessons are also available at Woodley Island.

Visitor Services Standards

The Service Manual (605 FW 1, Section 1-7) provides Service policies, strategies and requirements for management of wildlife-dependent recreation programs within the National Wildlife Refuge System (Refuge System).

The Service Manual (605 FW 1, Section 1.6) states: the Refuge System provides a unique opportunity to ensure that we approach our compatible wildlife-dependent recreation programs from the perspective of the Refuge System mission and goals. We believe wildlife-dependent recreation that comports well with the following criteria will continue to meet the needs and desires of refuge visitors. To ensure continued visitor satisfaction with our wildlife-dependent recreation programs, we incorporate public input using visitor satisfaction surveys, feedback given in person or other instruments, including input during the development of the CCP and VSP, that help us define and evaluate wildlife-dependent recreation programs at Humboldt Bay NWRC. We develop our wildlife-dependent recreation programs in consultation with State fish and wildlife agencies and stakeholder input based on the following criteria:

- Promotes safety of participants, other visitors, and facilities;
- Promotes compliance with applicable laws and regulations and responsible behavior;
- Minimizes or eliminates conflict with fish and wildlife populations or habitat goals or objectives in an approved plan;
- Minimizes or eliminates conflicts with other compatible wildlife-dependent recreation;
- Minimizes conflicts with neighboring landowners;
- Promotes accessibility and availability to a broad spectrum of the public;
- Promotes resource stewardship and conservation;
- Promotes public understanding and increases public appreciation of America's natural resources and our role in managing and conserving these resources;
- Provides reliable/reasonable opportunities to experience wildlife;
- Uses facilities that are accessible to people and blend into the natural setting; and
- Uses visitor satisfaction to help define and evaluate programs.

Section A: Humboldt Bay NWR

Welcome and Orient Visitors

We will assure that our refuge is welcoming, safe and accessible. We will provide visitors with clear information so they can easily determine where they can go, what they can do, and how to safely and ethically engage in recreational and educational activities. Facilities will meet the quality criteria defined in 605 FW 1, Section 1.6 of the Service Manual. We will treat visitors with courtesy and in a professional manner.

Welcome and Orient Visitors Goals/Objectives

Our Visitor Services goal is to:
Provide public with safe, high-quality wildlife-dependent recreation and volunteer opportunities to enhance public appreciation and understanding of fish, wildlife, plants, and habitats of Humboldt Bay and associated watersheds.

Welcome and Orient Visitors Strategies

1. Improve directional signage on refuge entrance road and parking lot.
2. Create new interpretive areas along entrance road to welcome and orient visitors.
3. Improve signage on buildings and trails to better welcome and orient visitors.

Current Program

In compliance with the policies governing National Wildlife Refuges, Humboldt Bay National Wildlife Refuge (HBNWR) is a welcoming, safe, and accessible facility. We provide visitors with clear information so they can easily determine where they can go, what they can do, and how to safely and ethically engage in recreational and educational activities. The facilities found on Humboldt Bay NWR are high-quality, clean, well-maintained, and accessible. We treat visitors with courtesy and in a professional manner.

The Richard J. Guadagno Headquarters and Visitor Center (Visitor Center), headquarters for the Humboldt Bay NWR Complex, is located just off the Interstate Highway 101, exit 696. Refuge signs are visible on the interstate from both the southern and northern approach.

Entrance to Richard J. Guadagno Headquarters and Visitor Center. Photo: USFWS

Once inside the refuge gates visitors drive approximately ½ mile before they initially see several buildings (the former refuge headquarters, refuge staff housing) and then come to a paved parking area and the Visitor Center. It is not compatible with overall resource management and visitor safety to have a separate auto tour route at Humboldt bay NWR. However, wildlife viewing opportunities are often available to visitors as they drive on the refuge entrance road. An interpretive pullout is provided on the entrance road just past the cattle guard to view geese and other wildlife. Once at the Visitor Center parking lot, visitors are drawn into the building by a breezeway and wildlife viewing deck. Refuge volunteers continue to develop native landscaping in the area around the facilities. Just to the west of the entrance is a small garden memorial dedicated to Richard J. Guadagno, the former refuge manager that was killed on September 11, 2001 aboard Flight 93 in Pennsylvania.

Memorial dedicated to former refuge manager, Richard J. Guadagno. Photo: USFWS

Inside the Visitor Center (open 7 days per week, 8am to 5pm, except Federal holidays), visitors are greeted by refuge volunteers and/or staff who work the reception area. The volunteers are knowledgeable about the refuge and welcome visitors. This personal touch helps the visitor feel welcome and also provides them with information about what to see and do at the refuge, or in the surrounding area. The Visitor Center also has an attractive series of dioramas which display a sample of the habitats, wildlife and plants found in the South Bay and Dune Units and at Castle Rock NWR. In addition, there is a large viewing room that looks out over a seasonal wetland supplied with spotting scopes for observing wildlife as well as a large screen TV for viewing FWS (and other) feature films. This room can be reserved for meetings and also has one corner called the "Fledgling Fort". This area has been outfitted by the Friends of Humboldt Bay NWR (FHBNWR), and dedicated as a space for smaller children to read, do art, or take part in other pertinent environmental education and interpretation activities.

Two brochures directly relating to the refuge are available at the front desk. The general refuge brochure is informative, attractive, and meets Service standards (Appendix A). It provides visitors with information on local ecology, a list of things to do and see on the refuge along with refuge maps. The second brochure is a list of fish, wildlife and plants found in the Humboldt Bay area. The refuge also maintains a current and informative web site. Many other brochures are available inside the Visitor Center relating to local activities, invasive weeds and maps of water trails and hiking trails found in the Humboldt Bay area.

Also visible from the parking lot is an old hunting clubhouse and beyond that a large old barn. The old hunting clubhouse is in need of restoration but was one of the oldest clubs in the state of California. The barn is architecturally interesting and is regularly the subject of artists and photographers.

Table B–1. NWR System 6 Priority Uses at Humboldt Bay NWR—15 Year Projection

Category of Use	Current Use	Anticipated Use[5]	% Increase
Waterfowl Hunting	1,500	1,800	20%
Salmon Creek Unit [1]	1,100	1,200	9%
All Other Units	400	600	50%
Fishing [2]	200	250	25%
Wildlife Observation/ Photography [3]	20,000	35,000	75%
Environmental Education/ Interpretation [4]	2,200	4,400	100%

Footnotes:
[1] Maximum capacity is approximately 3600 hunters per season
[2] Fishing opportunities are relatively few and use is light; mainly for sharks at very high tides
[3] Population growth and increased lands/facilities should justify
[4] 500 students per year in field trip visits, 1100 visitors per year for special events, 600 visitors per year for guided walks
[5] 15-year projection of estimated anticipated use in 2024

** All numbers are approximate estimates*

Proposed Changes
There are plans for improved directional signage, an improved refuge entrance area that will include a gate, turn around area for large vehicles w/trailers, and additional orientation signage and information. Additions to the Richard J. Guadagno Visitor Center will include an entrance sign at the apex of the breezeway entrance and orientation, informational and interpretive panels in the breezeway, viewing deck and boardwalk areas. Future plans would add a small bookstore to the Visitor Center and call for the installation of a video camera that would feed live wildlife footage back to the large screen TV in the viewing room.

Plans currently call for conversion of the old hunting clubhouse into an interpretive "Historic Hunt Cabin" with exhibits focused on early land management, the waterfowling history of Humboldt Bay, and the role that waterfowl management has played in conservation both locally and nationally. The refuge staff is evaluating the potential and costs of using part of the old barn for Environmental education/interpretation or maintaining it in a functional state into the future. Currently the barn is in need of maintenance and is used for the storage of refuge equipment.

The Ma-le'l Dunes Unit (acquired in 2005) is proposed to open to the public in 2008-2009 with the implementation of the Ma-le'l Dunes Unit Cooperative Management Area Access Plan (Appendix B). This unit will provide opportunities for wildlife observation, photography, environmental education and interpretation, hunting and fishing.

Monitoring and Evaluation
Visitation is monitored by several systems. A network of traffic and trail counters records both types of use at the units of highest visitation. A record of visitors per day is kept at the Visitor Center. This information is entered into a computer database kept current each month. School visitation numbers, off-site outreach, multipurpose room use by the community and special events attendance records are all recorded into separate computer databases.

Hunting History and Opportunities at the Refuge

Hunting is a wildlife-dependent recreational use and, when compatible, an appropriate use of resources in the Refuge System. Humboldt Bay NWR's hunting program will meet the quality criteria defined in the Visitor Services Standards above and will be carried out in a manner consistent with State laws, regulations, and management plans. Waterfowl hunting has taken place on the refuge since establishment in 1971 and on the Salmon Creek Unit since 1988, when it was acquired. The capacity for hunters at Salmon Creek Unit under current operations in approximately 1100 hunters per year. We really have no cost effective way to reliably estimate the amount of hunting that takes place on other refuge units.

Hunt Program Goals

- Provide a quality wildlife-dependent recreational experience, using a renewable natural resource.
- Promote hunter education and ethics through information and enforcement of hunting regulations and compliance with compatibility determinations.
- Provide mobility-impaired hunters accessible blinds and a quality experience.
- Promote designated hunts and educational opportunities for youth hunters.

Hunt Program Objectives

- Within 15 years maintain and improve existing waterfowl, coot, common moorhen and snipe hunting program to accommodate a minimum of 1,200 hunter opportunities per year on the Salmon Creek Unit and continue waterfowl, coot, common moorhen and snipe hunting on Table Bluff, Eureka Slough, and Jacoby Creek Units as well as Egret Island, Teal Island, and Hookton Slough, concurrent with state regulations.
- Improve information and outreach of existing regulations.
- Open limited areas of the Ma-le'l Dunes Unit to waterfowl, coot, common moorhen and snipe hunting and retrieval and provide two additional junior-only hunting days on the Salmon Creek Unit.

Rationale

The existing (1990) Humboldt Bay NWR Sport Hunting Plan has been revised concurrently with the preparation of the Humboldt Bay NWR Complex's CCP (Appendix G).

Hunting is one of the six priority public uses identified in the National Wildlife Refuge System Improvement Act of 1997. Currently waterfowl hunting regulations on the Salmon Creek Unit are temporally less permissive than State hunting regulations, but otherwise identical. Hunting on the Salmon Creek Unit is permitted from legal shoot time to 3 pm on Tuesdays and Saturdays of the regular waterfowl hunting season (usually the third weekend in October through the last weekend in January). Waterfowl, coot, common moorhen and snipe hunting is permitted on the Table Bluff, Eureka Slough, and Jacoby Creek units, including Egret Island, Teal Island and Hookton Slough, concurrent with state regulations. In the best professional judgment of the Humboldt Bay NWR Manager, restricting the number of days per week that hunting occurs on the Humboldt Bay NWR maintains a high quality hunting experience. Upland game (except snipe) and big game hunting is not permitted on the Humboldt Bay NWR due to the small size of potential hunt areas, safety issues, and likelihood for conflicts with other priority wildlife-dependent recreational uses recognized by the Improvement Act.

New waterfowl hunter check station and parking area constructed in 2005. Photo: USFWS

After multiple discussions with hunters and their representatives, the following adjustments will help balance public use goals at the Ma-le'l Dunes Unit. Hunting will be allowed on the portion of Fernstrom-Root

Islands owned by the Service, but no permanent blind construction is permitted. Ma-le'l Island, adjacent to Fernstrom-Root Island and the Hop'o'y Trail, will only be open to retrieval of downed waterfowl, not active waterfowl hunting. Lastly, educational materials on hunting and the rights of all refuge wildlife-dependent recreation user groups will be posted at the Ma-le'l Dunes Unit to avoid conflicts between different user groups. Portions of the recently acquired Ma-le'l Dunes Unit adjacent to the Mad River Slough, while privately owned, were hunted for waterfowl, coot, and snipe prior to acquisition by the Service, so the refuge will be opening portions of these areas to hunting and/or retrieval from adjacent areas that are open to hunting.

Limited youth only hunting opportunities in the Humboldt Bay area and the high quality of waterfowl hunting on the Salmon Creek Unit justifies the addition of two days for junior (age 16 and under) only hunts. In addition, allowing less experienced junior hunters to learn hunting skills outside of the regular hunting times will avoid impacts on the quality of the hunting experience for regular, more experienced hunters.

Potential Hunting Strategies

1. Maintain current sport hunting program as described in the updated Humboldt Bay NWR Sport Hunting Plan.
2. Continue to fund and use MOUs with Federal, State and local agencies for law enforcement support.
3. Follow necessary procedures to permit waterfowl hunting on portions of the island salt marsh areas of the recently acquired Ma-le'l Dunes Unit.
4. Add two junior only waterfowl hunt days per season at the Salmon Creek Unit.
5. Improve interpretation and outreach, especially on Salmon Creek, Hookton Slough, Jacoby Creek, and Ma-le'l Dunes Units to make sure that where hunting and other wildlife dependent visitor uses come together, all users are aware and all uses are managed for maximum mutual compatibility.
6. Conduct daily bag checks (i.e., verify number and species of waterfowl) – which will promote compliance with regulations and to keep biological data on species harvest.
7. Improve hunt program record keeping by improving harvest record card.
8. Improve directional signs in the hunt area on the Salmon Creek Unit.
9. Create new maps of hunting areas to improve accuracy and improve the quality of the hunting experience and the efficiency of the hunting system.
10. Increase staffing of hunter check station, to a minimum of two individuals per hunt day (Humboldt Bay NWR staff, temporary hires/contractors, or volunteers) to best manage refuge hunt.
11. Modify hunting pit blinds to prevent stranding of wildlife.
12. Post additional boundary signs on the Eureka Slough Unit, the Jacoby Creek Unit, the Table Bluff Unit, Egret Island, Teal Island, and Hookton Slough.
13. Enforce boat in only regulations on Humboldt Bay NWR land on the Eureka Slough Unit (ESU) and the Jacoby Creek Unit in order to meet FWS safety standards.
14. Work w/CDFG, HBHRCD and FWS Solicitor's Office to clarify legal jurisdiction of over-water hunting in bay sloughs and salt marsh islands.
15. Seek funding for a new FTE Visitor Services Assistant/Volunteer Coordinator position to assist in planning and implementing projects.
16. Increase law enforcement on the Humboldt Bay NWR, especially during waterfowl season, by contract or through support from other Service law enforcement staff.

Current Program
See Chapter 3 of the CCP

Proposed Changes
See Hunt Plan (Appendix G of the CCP)

Monitoring and Evaluations
See Hunt Plan (Appendix G of the CCP)

Provide Quality Fishing Opportunities

Sport fishing (fishing) is a wildlife-dependent recreational use and, when compatible, an appropriate use of resources in the Refuge System. Fishing programs will meet the quality criteria defined in the Visitor Services Standards above and be carried out in a manner consistent with State laws, regulations and management plans as well as refuge specific regulations.

Fisherman at the Hookton Slough non-motorized boat dock. Photo: Shannon Smith

Fishing Objectives

- Maintain existing sport fisheries program. Provide fishing opportunities at the Ma-le'l Dunes Unit.
- Collaborate with CDFG and other local agencies and private entities to increase awareness of fishing and shellfishing opportunities on the Humboldt Bay NWR and/or in Humboldt Bay.

Rationale

The existing (1990) Humboldt Bay NWR Sport Fishing Plan has been revised concurrently with the preparation of the Humboldt Bay NWR Complex's CCP (Appendix H).

Fishing is one of the six priority public uses identified in the National Wildlife Refuge System Improvement Act of 1997. Most local fishing occurs in freshwater areas that are not within the refuge boundaries. Limited fishing does occur for sharks, rays, and shellfish on Humboldt Bay NWR. Shell fishing is most popular on South Bay mudflats. Many other freshwater and saltwater fishing areas are located nearby to the Humboldt Bay NWR.

While fishing opportunities on the Humboldt Bay NWR are limited, fishing is a priority wildlife dependent recreational use recognized by the Improvement Act and additional outreach may promote its use by the public.

Potential Fishing Strategies

1. Maintain current fishing program as described in the updated Humboldt Bay NWR Sport Fishing Plan.
2. Continue to fund and use MOUs with Federal, State and local agencies for law enforcement support.
3. Incorporate elements of FWS Initiatives (I.e., Connecting People with Nature).
4. Enhance outreach and education on fishing regulations and opportunities on Humboldt Bay NWR.
5. Increase signage at allowable sport fishing sites.
6. Advertise and participate in events which promote fishing (ex.CDFG free fishing day, FWS fishing days, etc.).
7. Conduct outreach at pertinent events, such as Harbor District Maritime Expo.
8. Increase law enforcement on the Humboldt Bay NWR by contract or hiring a seasonal law enforcement officer.

Current Program

See Chapter 3 of the CCP

Proposed Changes

See Fishing Plan (Appendix H of the CCP)

Monitoring and Evaluations

See Fishing Plan (Appendix H of the CCP)

Provide Quality Wildlife Observation and Photography

Visitors of all ages and abilities will have an opportunity to observe and photograph key wildlife and habitat on the refuge when it is compatible with the refuges purposes. Viewing wildlife in natural or managed environments should foster a connection between visitors and the natural environment.

The trails in the Lanphere Dunes Unit pass near fragile forest habitats and out onto the foredune complex. Guided tours help visitors understand the ever changing ecosystem. Photo: © Yvonne Everett

Wildlife Observation and Photography Goal

To provide the public (especially children) with accessible, safe, high-quality wildlife-dependent recreation opportunities to enhance the public's appreciation and understanding of Humboldt Bay's fish, wildlife, plants, habitats and associated watersheds.

Wildlife Observation and Photography Objectives

- Within 15 years provide 35,000 annual wildlife observation and photography visitor opportunities by land and water trails (see Table B-1).
- Within 15 years provide 1.5 miles (entire Shorebird Loop Trail) of wheelchair accessible trail.
- Provide a total of 3.5 miles of ADA trail at Salmon Creek (1.5 miles), Hookton Slough (1.5 miles), and Ma-le'l Dunes (.5 mile) units.
- Within 2 years, implement all phases of the Ma-le'l Dunes Cooperative Management Area Access Plan which includes: an expanded trail system, interpretive panels, a viewing deck, a volunteer caretaker, restrooms, and if feasible (see concerns below), and a non-motorized boat launch at the Ma-le'l Dunes Unit. The majority of these improvements will be acquired through a grant from the California Coastal Conservancy.

Rationale

Wildlife observation and photography are two of the six priority public uses identified in the National Wildlife Refuge System Improvement Act of 1997. Despite a small staff and a refuge of relatively small size, all six priority public uses are made available at Humboldt Bay NWR. With few exceptions, the vast majority of wildlife species found on the refuge can be viewed and/or photographed from existing trails and/or blinds. A common comment from the public at this and many other refuges is, "The trails you have are great but we would like to hike/bike/drive around the rest of the refuge". While this desire to "see the rest of the refuge" is understandable, it is often not compatible when considered cumulatively with all other actions occurring on the refuge. Managers need to clarify for the public the distinction between managed wildlife-dependent recreation and the (public's) perception of all areas of the refuge being open.

Similar to national trends, there is a large and growing desire for wildlife observation and photography opportunities on the Humboldt Bay NWR. If additional staff and project resources are available, the refuge could provide increased opportunities for wildlife observation and photography from refuge facilities, if compatible.

One way people are getting out and observing and photographing wildlife is by non-motorized boating. This type of recreation has increased dramatically both nationally and on Humboldt Bay in the last 20 years. In order to help accommodate this increasing use around the bay the refuge would like to pursue construction of a non-motorized boat launch on the Ma-le'l Dunes Unit (MDU). However, prior to construction, the CA Dept. of Public Health (CDPH), the HBHRCD and local oyster growers must be assured that additional public use on the MDU will not jeopardize the water quality rating (and the oyster companies businesses) in the slough. Construction of the non-motorized boat launch will be based on demonstration of acceptable water quality to CDPH. If additional resources are available, offering increased opportunities for the public to observe wildlife would build local support and appreciation for Humboldt Bay NWR and the natural resources it helps to conserve.

Potential Wildlife Observation and Photography Strategies

View from Visitor Center deck towards the Shorebird Loop Trail and Table Bluff. Photo: USFWS

1. Maintain existing Visitor Services Programs and infrastructure, making all as fully accessible as possible. Include completion and upgrading of interpretive exhibits, panels, and signage plans.
2. Work with Friends Groups and other partners to develop and implement FWS Initiatives (Connecting People with Nature, Schoolyard Habitats and Birding Initiatives).
3. Develop wheelchair access out to the kiosk on the Salmon Creek Unit and on the Ma-le'l Dunes Unit Cukish trail.
4. Continue to collaborate with Friends Groups and other partners to provide wildlife observation day use opportunities.
5. Continue to work with local and national wildlife photography groups (and individuals) to improve wildlife photography day use opportunities on the refuge, including a fully accessible photo blind.
6. Install a wildlife camera on the Salmon Creek Unit which will provide opportunities for "live action" wildlife observation from the closed portion of the refuge back to a large screen TV at the Visitor Center.
7. Monitor and assess disturbance caused by different public uses on Humboldt Bay NWR to both develop a baseline of use and provide the best possible management direction regarding existing and proposed future uses.
8. Work with partners to fully implement Ma-le'l Dunes Cooperative Management Area Access Plan, including the non-motorized boat launch if water quality stipulations are met.
9. Work with HBHRCD, Redwood Community Action Agency (RCAA) and Humboldt Bay boating groups to produce an assessment of needs for safe, compatible boating experiences (including the proposed bay trail(s)) on or adjacent to the refuge and then implement recommendations.
10. Work with same groups on producing guidelines and doing outreach to boating community on avoiding impacts (especially disturbance) to natural resources on and around the bay.
11. Provide both signage and brochures explaining the need to maintain high water quality, how/where to properly dispose of waste, and the need to be good stewards of the bay.
12. Assess opportunities to increase seasonal day use hiking on the Salmon Creek Unit around the hunt area or other areas which are normally closed to the public.
13. Work with CA Coastal Conservancy, HBHRCD, Redwood Community Action Agency (RCAA), City of Arcata, Humboldt County, and groups interested in the "Trail Around the Bay" to assess the potential and compatibility of a bay trail(s)) on or adjacent to the refuge.
14. Seek funding for a new FTE Visitor Services Assistant position to assist in planning and implementing projects.
15. Increase law enforcement on the Humboldt Bay NWR by contract or hiring a seasonal law enforcement officer.
16. Assess need to implement a fee collection program.

Current Program

One of the main goals of Humboldt Bay NWR is to provide all sectors of the public with quality wildlife observation and wildlife photography opportunities. Wildlife can usually be seen while traveling down the entrance drive to refuge headquarters. Once at headquarters, a universally accessible deck and short boardwalk attached to the Richard J. Guadagno Visitor Center provides a wildlife observation area for all visitors, including those with severe mobility challenges. The Shorebird Loop Trail (1.7 miles round trip) adjacent to the Visitor Center is level and consists of gravel and packed dirt. The trail provides visitors with wildlife viewing and photography opportunities and features an observation kiosk and interpretive panels. The trail is open during Visitor Center hours seven days per week. The trail passes along seasonal

freshwater wetlands, eventually leading to a permanent brackish pond and the eastern edge of Hookton Slough. A spur trail from the Shorebird Loop Trail leads to the refuge's permanent photography blind. The photography blind is open seasonally, depending on water conditions. Reservations are required for the photography blind. Visitors use the refuge website to obtain availability and reservation information for the photography blind. Additionally, numbered posts along the trail correspond to a trail guide developed by the Friends of Humboldt Bay NWR. The trail guide provides additional historical, biological and regional information to visitors. Trail guides, wildlife lists, and plant lists are available at the Visitor Center. Binoculars and a "Discovery Pack" are also available for checkout. Discovery packs include identification guides for plants, animals, tracks and scat, binoculars, magnifying glasses and a field notebook.

The Hookton Slough Unit is open daily from sunrise to sunset. The 1.5 mile trail (one way) starts in the parking area and follows the south bank of Hookton Slough. Visitors pass along grasslands, marsh, freshwater, saltwater, and mudflat habitats. The trail is level, graveled, and has interpretive panels. Maps of a boating trail that leads through Hookton Slough to South Bay can be found inside the Humboldt Bay NWR brochure. A boat dock for use by non-motorized boats is available to the public at Hookton Slough. There are also vault style restrooms at the parking lot. Trail maps for the Salmon Creek and Hookton units are available on the refuge website and in the Visitor Center (Appendix C).

The Lanphere Dunes Unit is accessible only by permit or guided tours. This unit of the refuge has guided walks led once a month by the Friends of the Dunes. Refuge staff also leads walks when time permits.

There are four hiking trails at the Ma-le'l Dunes Unit of the refuge. This first is the Cukish Trail. The Cukish (meaning "bird" in Wiyot) Trail extends 2,800 feet north from the Ma-le'l North parking area along a berm that once held an old railroad line on the edge of the Mad River Slough. It serves as the entry route to a forest loop and beach access trails found throughout the Ma-le'l Dunes Unit. Trail maps for Lanphere and Ma-le'l Dunes units are available on the refuge website and in the Visitor Center (Appendix D). Improvements along this trail (taken from the Ma-le'l Dunes Unit Cooperative Management Agreement (MDUCMA) will include:

- Preliminary upgrade which will include trail clearing and grubbing to a 3' minimum width, and an 8' overstory clearance.
- ADA accessibility upgrade to the trail.
- Installation of "bio-engineered" erosion control measures to protect the berm and the installation of benches and a wetland view deck.

To accommodate ADA accessibility, along the Cukish Trail, typical design requirements will be based on CalDAG 2000 and should include:

- 48-inches minimum trail width, which may be reduced to 36-inches in areas where significant site disruption would otherwise occur.
- Minimum 60 inches x 60 inches passing/rest area at minimum 200 feet apart, or two rest areas for every 400 feet.
- Hard surfaces such as asphalt, natural emulsion pavement or concrete.
- Trail gradients maximum running slope 5 % and cross gradient 2%.
- One ADA accessible parking space should be provided at trail parking lot.
- Maintain 36-inch clearance between gates or bollards.

The Ki'mak (meaning whale in Wiyot) Trail, is a proposed new trail that will extend from the Cukish Trail up a large dune, past a dune overlook, over open sand and nearshore dunes, to the beach. It passes through the corner of Ma-le'l South/BLM property, a portion of Humboldt Bay wallflower populations, and nearshore dunes densely vegetated with European beachgrass.

The Ki'mak Trail will include the following improvements:

- The trail will be marked with trail markers at appropriate sight distances for clear trail delineation, as discussed in the signing section.

The Hop'o'y (meaning "berries" in Wiyot) Trail, is an existing loop trail through the forest that will extend from the Cukish Trail. The Hop'o'y Trail will include the following improvements:

- At the Hop'o'y trailhead steps and rail will be installed to ease access Ma-le'l Dunes Cooperative Management Area and eliminate erosion potential.

- Along the Hop'o'y Trail approximately 150 feet of steps and rail will be installed to replace a dilapidated wooden staircase.

Visitors learn to paint shorebird and duck silhouettes at the Humboldt Visitor Center during Family Fun Days.
Photo: Shannon Smith

- In the area where there is a predominance of reindeer lichen (*Cladina portentosa* ssp. *pacifica*), the trail will be re-aligned and delineated with peeler core logs or other natural material to protect this unique and sensitive ecosystem.

- The trail that leads to the bank of Iron Creek will be decommissioned in order to eliminate impact to salt marsh vegetation.

The Hudt (meaning surfish in Wiyot) Trail, will be an open dune trail to the beach that extends from the forested Hop'o'y Trail. The trail will ascend a large dune, descend to nearshore dunes, and cross a seasonal wetland where it will continue over the primary dune system to the beach. Hikers can return to the forest by following this trail in reverse or by walking south on the beach strand for approximately 1,000 feet to a marked trail that re-enters the foredunes and returns to the Ma-le'l North parking area via the Ki'mak Trail. The set of trails could also be hiked in reverse by starting at the Kimak Trail. The Hudt Trail may include the following improvements:

- A new, less steep forest exit, or forest egress, will be delineated at the Hudt trailhead and cable steps will be installed to enhance access up the dune and out of the forest.

- The trail will be marked with trail markers at appropriate sight distances for clear trail delineation, as discussed in the signing section. In particular, a marker will be placed north of the large dune that is visible from the top of the forest dune egress steps.

A small puncheon-style footbridge will be installed in the foredunes across the seasonal wetland.

Proposed Changes
See Proposed Wildlife Observation and Photography strategies for proposed changes.

Monitoring and Evaluation
Vehicle and trail counters on the refuge assist in monitoring the number of visitors monthly. Docents at the Visitor Center also keep track of visitors to the Salmon Creek Unit daily. The Visitor Center is staffed seven days a week by staff and volunteers. Staff and volunteers engage visitors in conversations that help evaluate the wildlife viewing facilities and program. Also, question and comments from our website visitors help assess our wildlife viewing program.

Provide Quality Environmental Education and Interpretation Opportunities

Volunteer leads an environmental education program on the Dunes.
Photo: Andrea Pickart

Environmental Education and Interpretation Objectives

- Within 15 years provide wildlife-dependent educational opportunities for at least 8 school or community groups per month and 35,000 annual visitor opportunities for interpretive experiences on and off refuge to foster public awareness and appreciation of the natural heritage of the north coast (see Table B-1). The current program includes 3 walks monthly at Salmon Creek Unit and 1 walk monthly at both Lanphere Dunes Unit and Ma-le'l Dunes Unit. With the addition of a 1/2 time FTE, 8 groups per month is reasonable goal.
- Develop a "Children's Outdoor Exploration Area" at the Salmon Creek Unit to provide unstructured environmental education opportunities for children.
- Within 3 years complete the Salmon Creek "Historic Hunt Cabin."
- Assess feasibility for an on-site environmental education outdoor classroom facility on the Salmon Creek Unit.

Rationale

Environmental education and interpretation are two of the six priority visitor uses identified in the National Wildlife Refuge System Improvement Act of 1997. The Humboldt Bay NWR provides a unique opportunity for the local community to experience pristine dune habitats, native bay habitats, and wildlife in proximity to an urban area with multiple educational institutions. Refuge-based environmental educational and interpretive activities can also be integrated into both indoor and outdoor classroom curricula. Interpretive activities can introduce the public to habitat management activities and familiarize them with the conservation efforts that protect local natural resources. The activities currently offered at the refuge are primarily the result of collaboration with refuge Friends groups and volunteer efforts, which we will seek to enhance.

If additional staff and project resources are available, the refuge will work with Friends groups, volunteers and others to provide additional environmental education and interpretation opportunities to foster public awareness and appreciation of Humboldt Bay and north coast's unique natural heritage; which will ultimately help to fulfill the purposes for which the refuge was established. The refuge will look at opportunities to implement existing (Junior Duck Stamp, The Nature of Learning, Project WILD, Shorebird Sister Schools, etc.) and new (Children in Nature, Schoolyard Habitats) environmental education and interpretation initiatives from the Service and others.

Potential Environmental Education and Interpretation Strategies

1. Maintain existing Visitor Services Programs and infrastructure, including completion and upgrading of interpretive exhibits, panels, and signage plans
2. Maintain, improve, and keep updated refuge website to provide information on refuge complex history, management, visitor service opportunities and current events.
3. Continue to offer guided bird walks by Friends of the Humboldt Bay NWR (FHBNWR) every other week and Audubon Society once per month.

4. Continue to offer Humboldt State University and College of the Redwoods professors, high school classes, and other local citizens' access to the Salmon Creek, Lanphere and Ma-le'l Dunes Units for guided and self-guided educational tours and study.
5. Continue to offer Friends of the Dunes guided natural history walks on the Dunes Units (once per month).
6. Continue to coordinate with the Friends of the Dunes (FOD), which leads a restoration work day one time per month on MDU or LDU and for their annual Spring Breakaway event.
7. Continue to coordinate with Friends of the Dunes for the annual lupine bash, work to involve additional partners (particularly North Coast Chapter of California Native Plant Society).
8. Continue to participate in interpretive events both on the refuge and off (ex. Aleutian Goose Fly-Off, CA Waterfowl Outdoor Adventure Day, CA State Fair, Humboldt County Fair, Godwit Days, ACG Festival, NWR Week, etc.).
9. Continue to offer a seasonal lecture series (3-6 per year) that interprets pertinent natural and cultural resources.
10. Continue to offer occasional presentations to community groups and college/university classes (four to six per year).
11. Continue to offer a self-guided trail guide, produced by FHBNWR, on the SCU.
12. Build on existing Outdoor Youth Days event and offer multi-day programs during the summer (i.e., Day Camp, Jr. Ranger/Naturalist, over-night experiences, etc.).
13. Work w/refuge Friends Groups to locate and develop a "Children's Outdoor Exploration Area" at the Salmon Creek Unit to provide "unstructured" EE/I opportunities for children.
14. Work with the Regional Office, AFWO, and Friends Groups to develop/implement environmental education programs that could include: Junior Duck Stamp, Schoolyard Habitats, Nature of Learning, Bay to Dunes, Shorebird Sister Schools, Salmon Creek Watershed Education, and others.
15. Work w/AFWO and two schools in the bay area to develop pilot Schoolyard Habitat Projects.
16. Complete the "Historic Hunt Cabin", which will interpret the history of the Salmon Creek Unit and how it came to be, refuge development, and the historic role of waterfowl management in Humboldt Bay NWR and the Refuge System.
17. Develop interpretive outreach for the public about the historical support hunters and fishermen have provided for the refuge system and conservation.
18. Assess feasibility of conversion of the barn or construction of a new covered outdoor structure for environmental education wet lab type activities.
19. Investigate finding grants and/or community assistance to acquire rain gear for use by K-12 visitors and facilitate visitation by economically challenged members of the community (i.e., shuttle buses/vans, etc.).
20. Develop an off refuge wildlife presentation for K-12.
21. Develop traveling trunks of educational materials for use by staff and/or Friends on and off-site.
22. Facilitate teacher training workshops so that teachers can lead environmental education field trips.
23. Create a curriculum that corresponds to California state education standards to cultivate an appreciation for refuge resources.
24. Design training guide for volunteer docents who would like to lead environmental education activities.
25. Provide for additional program assistance through trained volunteers, friends, interns, grant funding, and other partnerships.
26. Develop and implement greening policies and then interpret greening activities completed on the refuge.
27. Seek funding for permanent full-time Information and Education Specialist and Volunteer Coordinator positions to assist in planning and implementing projects.

Current Environmental Education Program

Currently the refuge offers pre-scheduled classroom visits, drop-in classroom visits and field trips to local school districts. School groups to the refuge can choose to have a self- guided or tour guided by refuge staff and volunteers. Schools can also choose from a variety of environmental education options, including hands on projects or experiments designed by refuge staff and local educators and media materials developed by the Fish and Wildlife Service.

Tours and educational walks are also led on the Lanphere Dunes Unit. Additionally, an environmental education curriculum called Bay to Dunes has been developed by the Friends of the Dunes, a Friends group of Humboldt Bay NWR. This curriculum is taught in area elementary schools when funds allow. The environmental education and outreach services of the refuge will continue to expand with the addition of full-time environmental education staff in the future.

Current Interpretation Program
Humboldt Bay NWR offers many special events throughout the year to interpret key resources and issues to the general public. These include the Aleutian Goose Fly-Off and Family Fun Weekend, Outdoor Adventure Day in partnership with the California Waterfowl Association and National Wild Turkey Federation, the Annual Youth Hunt Day in partnership with California Waterfowl Association, National Wildlife Refuge Week events and Earth Day. In addition, the refuge offers a series of quarterly talks called "Friday Nights at the Refuge." A variety of speakers present on a diversity of topics related to natural resource management. The refuge has also developed outreach materials both in the visitor center and on the refuge website to familiarize visitors with key wildlife and issues relating to the refuge such as a featured species of the month, "Nature's Calendar", track plate and touch box exhibits and interpretational exhibits.

Bureau of Land Management Chief Ranger Jeff Knisley checks a youth hunter's bag at Humboldt Bay NWR
Photo: Sean Brophy

Staff and volunteers of the refuge also lead tour groups regularly and provide on site assistance and information for all facets of interpretation of the refuge's resources and management. Refuge brochures and handouts containing information on the refuge, watchable wildlife, hunting, environmental education, photography and fishing programs are utilized by visitors. A variety of videos about the Fish and Wildlife Service and the National Wildlife Refuges System are available upon request. Development of a video highlighting the story of the Aleutian Cackling Goose, a key species of the refuge, is also underway. Refuge related information is also provided at annual local festivals and events such as the Aleutian Goose Festival and Godwit Days.

Proposed Changes
If additional staff and project resources are available, the refuge should provide additional environmental education and interpretation opportunities to foster public awareness and appreciation of the unique natural heritage of the Humboldt Bay and north coast area, which will ultimately help to fulfill the purposes for which the refuge was established.

The refuge will work with schools and colleges to integrate environmental concepts and concerns into structured educational activities. These refuge-lead or education-conducted activities are intended to actively involve students or others in first-hand activities that promote discovery and fact-finding, develop problem solving skills, and lead to personal involvement and action. Refuge staff will promote environmental education that is aligned to the current Federal, State and local standards, is curriculum based, meets the goals of school districts adopted instructional standards, and provides interdisciplinary opportunities that link the natural world with all subject areas. The environmental education program will be managed in accordance with Service Manual 605 FW 6 Environmental education.

Monitoring and Evaluation
The reservation and application process to schedule an Environmental Education and Interpretation visit assists refuge staff in monitoring the environmental education programs. The application (available in paper copy and on the refuge web site) records the name of the school, teacher, and date, educational goals for the visit, arrival and departure time, number of students and adults, grade level, items requested for loan, and requested environmental education activities. Teacher feedback assists with managing the environmental education and interpretation programs. Sign-in sheets for tours led by staff and volunteers monitor the level of interpretation provided. Annual on and off refuge events are monitored by refuge staff recording the event and number of participants and are recorded in both an outreach log and an annual report.

Manage for Other Recreational Use Opportunities

We may allow other recreational uses that support or enhance wildlife-dependent recreational uses or minimally conflict with any of the wildlife-dependent recreational uses when we determine they are both appropriate and compatible. We will allow uses that are legally mandated to occur due to special circumstances (606 FW 1).

Communicate Key Issues with Offsite Audiences

Effective outreach depends on open and continuing communication and collaboration between the refuge and its many publics. Effective outreach involves determining and understanding the issues, identifying audiences, listening to stakeholders, crafting messages, selecting the most effective delivery techniques, and evaluating effectiveness. If conducted successfully, the results achieved will further refuge purposes and the Refuge System mission.

Proposed Changes
Non wildlife-dependent uses are not currently allowed on the refuge. Bicycling is allowed only on the main refuge entrance road at the Salmon Creek Unit and the entrance road at Ma-le'l Dunes Unit.

Monitoring and Evaluation
The refuge will monitor and evaluate the outreach program by following the guidance of the National Outreach Strategy: A Master Plan. A media list for outreach activities is updated annually. Refuge outreach activities, including number of participants, are recorded in an outreach log. Refuge staff networks with local chambers of commerce, civic organizations, educational systems and many partners including the Friends of Humboldt Bay NWR, Friends of the Dunes, California Waterfowl Association, the Audubon Society and others to discuss outreach options and ideas. Suggestions are also taken from the refuge website.

Refuge Outreach, Volunteers, and Partnerships

Volunteer and Friends organizations fortify refuge staffs with their gifts of time, skills, and energy. They are integral to the future of the Refuge system. Where appropriate, refuge staff will initiate and nurture relationships with volunteers and Friends organizations and will continually support, monitor and evaluate these groups with the goal of strengthening important refuge activities and programs. The National Wildlife Refuge System Volunteer and Community Partnership Enhancement Act of 1998 strengthens the Refuge System's role in developing effective partnerships with various community groups. Whether through volunteers, Friends organizations, or other important partnerships in the community, refuge personnel will seek to make the refuge an active community member, giving rise to a stronger Refuge System.

Outreach, Volunteer and Partnership Objective

- Over 15 years refuge staff will collaborate with Friends groups and other regional partners to annually host at least two regionally based environmental education field trips, workshops, seminars, or study courses and refuge staff will take a local leadership role in developing and strengthening partnerships.

Rationale
Part of the mission of the Service is, working with others, to conserve, protect and enhance fish, wildlife, and plants and their habitats. Staff at the Humboldt Bay NWR realizes that all wildlife, plants, and habitats on the refuge are part of an interdependent ecosystem that extends beyond the refuge boundaries. Providing outreach to the public and developing partnerships is the best way to manage the Humboldt Bay ecosystem for the benefit of all. Additionally, when the public and partners are not aware of the refuge and its role in local, regional, and national conservation they are less likely to value, appreciate, or advocate for the resources on the refuge.

If additional staff and project resources are available, the Humboldt Bay NWR should provide additional environmental education and outreach to contribute to protecting the Humboldt Bay ecoregion.

Potential Volunteer and Partnership Strategies (From Visitor Services Alternatives

1. With Friends, volunteers, and staff continue to participate in interpretive events on the refuge (for example, ACG Fly-Off and Family Fun Weekend, CA Waterfowl Outdoor Adventure Day, etc.).
2. With Friends, volunteers, and staff continue to participate in off-site interpretive events (California State Fair, Godwit Days, ACG Festival).
3. Continue to involve volunteers in a variety of refuge programs to strengthen ties with the community.
4. Incorporate elements of FWS Initiatives (Connecting People with Nature and Birding Initiatives).
5. Work with Friends to develop and implement Friends Groups priority projects for the refuge (Children's Outdoor Exploration Area, bookstore, etc.).
6. Pursue funding for permanent full-time Information and Education Specialist and Volunteer Coordinator positions to assist in planning and implementing projects to strengthen and enlarge the volunteer services program, and to provide effective training and program management of the program for a corps of 50-100 volunteers.

Current Program

The Friends and volunteers of Humboldt Bay NWR enrich refuge staff with their gift of time, skills and energy. Humboldt NWR is affiliated with two official friends' organizations: Friends of Humboldt Bay NWR and Friends of the Dunes. The Friends of Humboldt Bay NWR, a relatively new organization, was formed in 2006. They work primarily at the Salmon Creek Unit of Humboldt Bay NWR and provide a multitude of services including greeting visitors at the visitor center, providing information about the refuge, and assisting the office staff and field personnel. The organization also leads several environmental education programs at the refuge and provides outreach into the community at local fairs and events.

Friends of the Dunes (FOD) was established in the mid-1970s to help conserve Lanphere Dunes, an area which did not become part of the refuge until 1997. FOD coordinates a number of conservation and restoration programs for all dune areas around the bay, including the provision of educational walks once a month on the dune units of Humboldt Bay NWR.

Humboldt Bay NWR also hosts an active roster of approximately 100 volunteers that assist with biological, environmental education, interpretive, wildlife observation, hunting, maintenance, outreach events and refuge activities. Additional individuals are signed up for one-time events such as Brush-Up Day of the hunting areas and the Outdoor Adventure Day.

The refuge has also formed strategic partnerships with the Sheriff Work Alternative Program (SWAP), the California Conservation Corps (CCC) and the Youth Conservation Corps (YCC) to provide maintenance work including facilities maintenance, habitat management and invasive weed removal.

Proposed Changes

If additional staff and project resources are available, the refuge should provide additional environmental education and outreach to contribute to protection of the Humboldt Bay ecoregion.

Monitoring and Evaluation

Volunteers are monitored through both an application process that enables refuge staff to match requested volunteer projects by refuge staff with volunteer interests and expertise. Volunteers may participate in specific work projects, special events or on specific days/hours. Each volunteer records their hours daily on time sheets, which are entered into the computer program "VolunteerWorks3.0 ™". This program allows staff to generate monthly and annual volunteer evaluation reports.

Other Applicable Programs

Youth Conservation Corps

The Youth Conservation Corps (YCC) is a well-balanced work-learn-earn program that develops an understanding and appreciation in participating youth of the Nation's environment and heritage. The YCC program will be administered in accordance with Public Law 93-408 and an interagency Letter of Cooperation. It is administered by the Forest Service, the Fish and Wildlife Service, and the National Park Service. YCC offers gainful summer employment to youth 15-19 years of age for approximately eight weeks. The organization and management of individual YCC projects will be governed by program objectives, budget limitations, and guidelines established by the Service, see Fish and Wildlife Service Manual Part 141. Within these objectives, limitations and guidelines, individual program operations, public

information and community relations concerning YCC will be the responsibility of the Host Site Supervisor, who will be the Assistant Refuge Manager.

YCC Objectives

The stated purpose of the YCC is to further the development and maintenance of the natural resources of the United States by America's youth and, in doing, to prepare them for the ultimate responsibility of maintaining and managing these resources for the American people.

There are three equally important objectives as reflected in the law:
1. Accomplish needed conservation work on public lands.
2. Provide gainful employment for young males and females from all social, economic, ethnic, and racial classifications.
3. Develop and understanding and appreciation in the participating youth of the Nation's natural environment and heritage.

The objectives are accomplished in a manner that provides the YCC crew member with an opportunity to acquire increased self-discipline. YCC crew members learn work ethics, how to relate to peers and supervisors, and how to build lasting cultural bridges with youth from other backgrounds.

Current Program

A YCC crew has been maintained each summer at the refuge since the program was first implemented on the refuge during the summer of 2002. The crew of 4 to 6 is supervised by one crew leader. During the eight week program, enrollees complete maintenance, construction, and invasive plant management projects and receive training and exposure to various conservation principles and issues.

Proposed Changes

None

Monitoring and Evaluation

At the end of each YCC program the crew leader prepares a YCC Crew Report detailing work projects completed, hours spent on projects and evaluates the program.

Refuge Law Enforcement

Visitor safety is a key issue in providing high quality wildlife-dependent recreation programs. Visitor safety at refuges is a high priority when developing compatible wildlife-dependent recreation programs. We use environmental education and interpretive programs to alert visitors to safety issues.

Refuge Law Enforcement Objectives

Continue to provide a safe environment for visitors, protect refuge resources, and ensure compliance with regulations through effective law enforcement.

Rationale:

An increasing number of refuge facilities and visitors necessitate an adequate level of safety and security through a law enforcement presence. Illegal activities, such as vandalism and illegal dumping, are present on refuge lands where there are public activities. A strict law enforcement program and the support of refuge partners is necessary to provide a safe, welcoming environment for visitors and staff. A well planned and coordinated program will be necessary to successfully address these concerns.

Refuge Law Enforcement Strategies

1. Continue to develop MOU's with various agencies to improve coordination, improve safety and coordinate efforts in areas of special concerns.
2. Increase law enforcement on the Humboldt Bay NWR by contract or hiring a seasonal law enforcement officer.
3. Provide public education and signage as part of law enforcement programs and provide a sufficient level of law enforcement from various agencies to address these issues.
4. Refuge staff will work closely with CDFG game wardens and Bureau of Land Management (BLM) rangers from surrounding public lands.
5. Annually maintain boundary, closed area, and other public use signs.

Current Program
Currently, there is no full-time nor duel-function refuge officer assigned to Humboldt Bay NWR. An MOU established in FY2007 with BLM provides for ~100 hours annually for law enforcement assistance to the refuge. A FWS zone law enforcement officer is located at Sacramento NWR and the Klamath Basin NWRC occasionally provides law enforcement coverage upon special request. The Humboldt County Sheriff's Department and officers from Humboldt State University also provide some coverage in case of emergency. Additionally, both CDFG and NOAA provide wildlife law enforcement coverage on an opportunistic basis.

Proposed Changes
Increase law enforcement on the Humboldt Bay NWR, especially during waterfowl season, by contract or by hiring a seasonal law enforcement officer.

Monitoring and Evaluation
All law enforcement activities during the hunting season are recorded in a law enforcement log. An annual meeting between all law enforcement partners is held at the refuge to evaluate the law enforcement program.

Concession Operations
There are currently no concession operations at Humboldt Bay NWR. The Friends of Humboldt Bay NWR plan to eventually install a bookstore in the Richard J. Guadagno Headquarters and Visitor Center.

Fee Programs
The Service is one of four Federal land management agencies (Fish and Wildlife Service, Bureau of Land Management, National Park Service, and National Forest Service), directed by Congress in 1996, to implement or expand fee collection sites as part of a program to explore the feasibility to better offset costs to administer recreation on public lands. In 2004, Congress passed the Federal Lands Recreation Enhancement Act which allows the government to charge a fee for recreation use of public lands managed by the Service, Bureau of Reclamation, National Park Service, Bureau of Land Management, and Forest Service.

A Recreational Use permit, operated under the Recreation Fee Program, is required at Salmon Creek Unit. The fee is used to fund the staff required to maintain a high quality managed hunt, in compliance with the Federal Lands Recreation enhancement Act of 2004. The fee is reduced by 50 percent for permanently disabled hunters and hunters over the age of 62. No fee is charged for hunters 16 and under.

Other
In "Fulfilling the Promise" the Service (USFWS 1999) identified the need to forge new and non-traditional alliances and strengthen existing partnerships with States, Tribes, non-profit organizations and academia to broaden citizen and community understanding of and support for the National Wildlife Refuge System. The Service recognizes that strong citizen support benefits the Refuge System. Involving citizen groups in refuge resource and management issues and decisions helps managers gain an understanding of public concerns. Partners yield support for Refuge activities and programs, raise funds for projects, are activists on behalf of wildlife and the Refuge System, and provide support on important wildlife and natural resource issues.

SECTION B: Castle Rock NWR

Introduction and Brief History
Approximately eighty miles north of Humboldt Bay, Castle Rock National Wildlife Refuge (CRNWR) lies about a half mile offshore from Crescent City, California. Castle Rock NWR is part of the Humboldt Bay National Wildlife Refuge Complex (Complex). Purchased in 1979 from the Nature Conservancy, Castle Rock NWR is only 14 acres in size, but is critical to the survival of several hundred thousand seabirds each year. Castle Rock rises 335 feet above sea level with a grassy slope, two large inlets, and cliffs that are important to nesting seabirds in the summer.

The cliffs provide nesting habitat for one of the largest breeding populations (~100,000) of common murres on the Pacific coast. Ten other species of seabirds also nest here, including three species of cormorants, pigeon guillemots, Cassin's and rhinoceros auklets, Leach's and fork-tailed storm-petrels, and tufted puffins. Because many of these bird species nest in burrows and crevices and are primarily nocturnal, they avoid

Castle Rock Photo © Stan Harris

predation by western gulls that also nest on the island. Castle Rock NWR is also a key roost site for up to 20,000 Aleutian cackling geese each winter and spring. Finally, Castle Rock NWR serves as an important haul out (resting site) for marine mammals, including harbor seals, northern elephant seals (both bear pups there), and California and Steller sea lions.

Castle Rock NWR is closed to the public to prevent disturbance to the seabirds, their habitat, and marine mammals. The birds and mammals of Castle Rock can best be seen in the early morning hours with a spotting scope from Pebble Beach Drive.

Castle Rock NWR Environmental Education and Outreach Goals

Provide high quality environmental education and information to the public regarding the ecology and sensitivity of the wildlife of Castle Rock NWR. Methods should include an existing web cam which is available online, as well as more traditional methods on the mainland including interpretive panels, brochures, and outreach to local communities and schools.

Rationale

Standard visitor service programs are inappropriate for Castle Rock NWR due to the potential for sensitive wildlife disturbance and the general inaccessibility of the island itself. However, by working collaboratively with Humboldt State University (HSU), the National Park Service (NPS), the US Coast Guard (USCG), the Bureau of Land Management (BLM) which manages adjacent islands as part of the California Coastal National Monument, the National Oceanic and Atmospheric Administration (NOAA), local tribes, agencies, schools, and individuals we can still effectively and efficiently reach interested audiences and provide educational and interpretive messages about the natural resources of Castle Rock NWR.

Castle Rock NWR Environmental Education and Outreach Objective

Over the 15 year life of the CCP, Complex staff will coordinate environmental education and interpretation programs on the seabird, marine mammal, and Aleutian cackling geese populations that use Castle Rock NWR with that of larger State, Regional, and other California Current System seabird programs. Within three years Complex staff will collaborate with National and State organizations to develop and provide additional environmental education, interpretation, and outreach to K-12 school groups, community groups, and individuals about Castle Rock NWR. Complex staff will also participate in at least 2 community events annually.

Proposed Castle Rock NWR Environmental Education and Outreach Strategies

1. Continue collaboration with Humboldt State University, National Park Service, and the United States Coast Guard to provide the seabird web-cam online.
2. Conduct outreach to educate the public, develop stewardship, and ultimately help protect the natural resources of Castle Rock NWR and integrate outreach with other programs.
3. Develop age group specific educational outreach DVDs based on webcam recordings.
4. Develop a brochure on Castle Rock's natural resources and how to protect seabird and marine mammal populations that use Castle Rock NWR.
5. Increase signage and distribute flyers to educate kayakers, the fishing community, and other users to the risk of disturbance, the potential impact on seabirds and marine mammals and the illegality of trespass or disturbance to wildlife.
6. Develop informational flyers specific to the Castle Rock NWR and distribute to Redwood State and National Park visitors center, local chambers of commerce and other tourism information locations.
7. Work with community partners (e.g., College of the Redwoods, Marine Mammal Center, and Siskiyou Field Institute) to provide educational interpretive field trips and courses using Castle Rock NWR to showcase wildlife, seabird and marine mammal ecology.
8. Work with partners to provide educational and interpretive information for their excursions around Castle Rock.
9. Coordinate with local tribal entities to provide interpretation of traditional uses of Castle Rock NWR as appropriate.
10. Collaborate with Redwood National and State Parks to increase environmental education and community outreach (ex. newsletters, web sites, campfire talks).

Current Program

With current staffing levels, Complex staff is only able to participate in one community event associated with Castle Rock NWR each year. A combination of Complex volunteers and permanent, seasonal, and temporary staff participate in the Aleutian Cackling Goose Festival annually and will continue to do so.

Proposed Changes

Within two years staff will develop new environmental education and interpretation partnerships that will allow participation in two events annually. Staff will coordinate environmental education and interpretation programs on species that use Castle Rock NWR with that of larger State, Regional, and other CCS seabird programs. Staff will also work with community partners to provide educational interpretive field trips and courses using Castle Rock NWR to showcase wildlife, seabird and marine mammal ecology.

Within three years Staff will collaborate with partners to develop and provide additional environmental education, interpretation, and outreach to K-12 school groups, community groups, and individuals. They will also coordinate with local tribal entities to provide interpretation of traditional uses of Castle Rock NWR as appropriate.

Monitoring and Evaluation

An outreach log is maintained for all activities relating to outreach and environmental education on the Complex; including Castle Rock NWR. No systems are currently in place to monitor visitor use of the observation area overlooking the refuge.

Implementing the Plan

Essential Staffing Needs

See Chapter 4 of the CCP.

Table of Projects, Costs

See Chapter 6 of the CCP.

Partnership Funding and Resources

See Chapter 4 of the CCP.

Compatibility Determinations
See Appendix F of the CCP.

NEPA Document/Decision Document
See Appendix E of the CCP.

ESA Section 7 Consultations
See Appendix I of the CCP.

Appendices

Appendix B-1: Humboldt Bay NWR Brochure
Find the brochure at http://www.fws.gov/humboldtbay/brochure.pdf

Appendix B-2: Ma-le'l Dunes Unit Cooperative Management Area Access Plan
http://www.friendsofthedunes.org/spotlight/MDCMA/

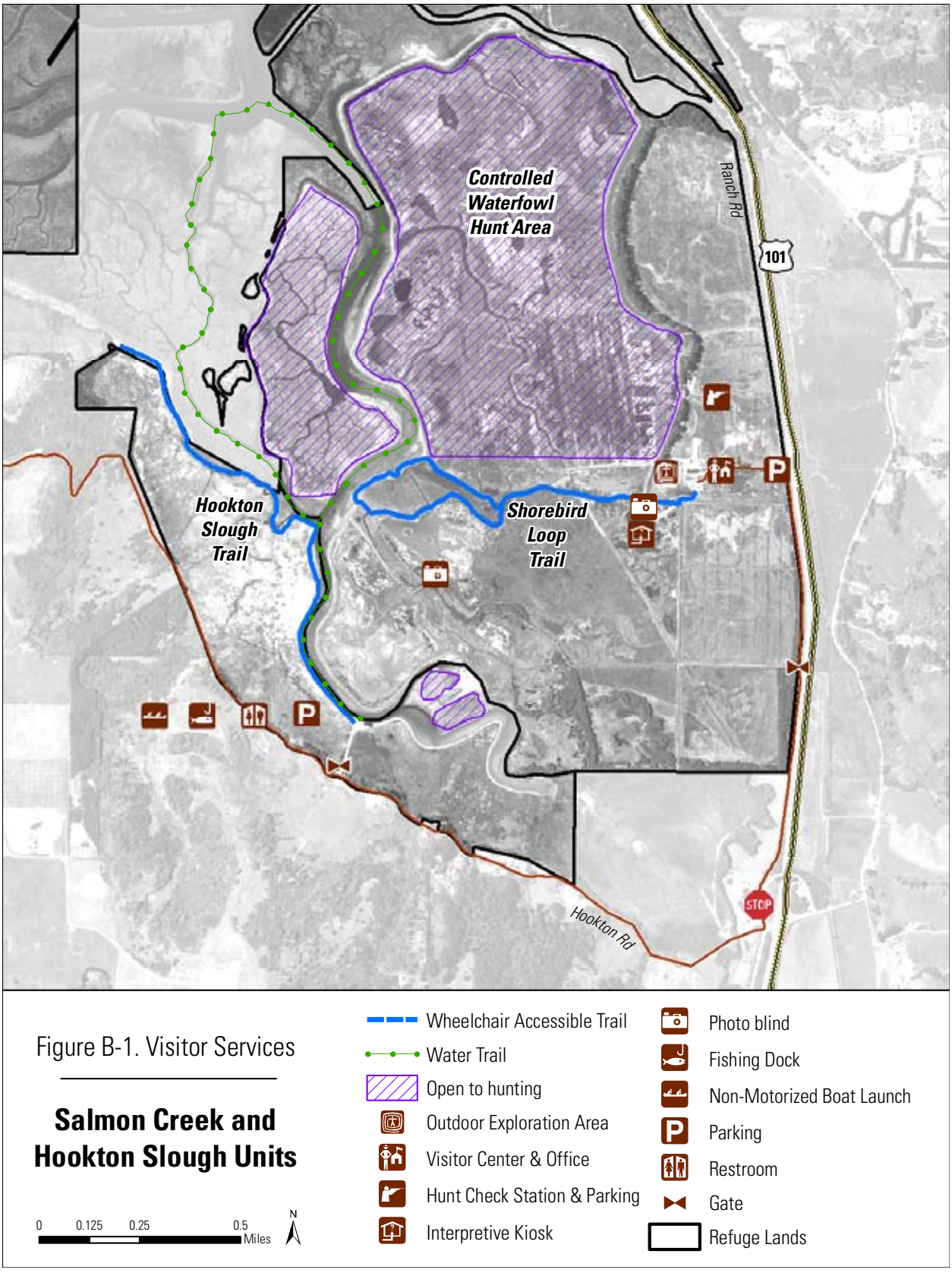

Figure B–1. Visitor Services Alternative—Salmon Creek and Hookton Slough Units

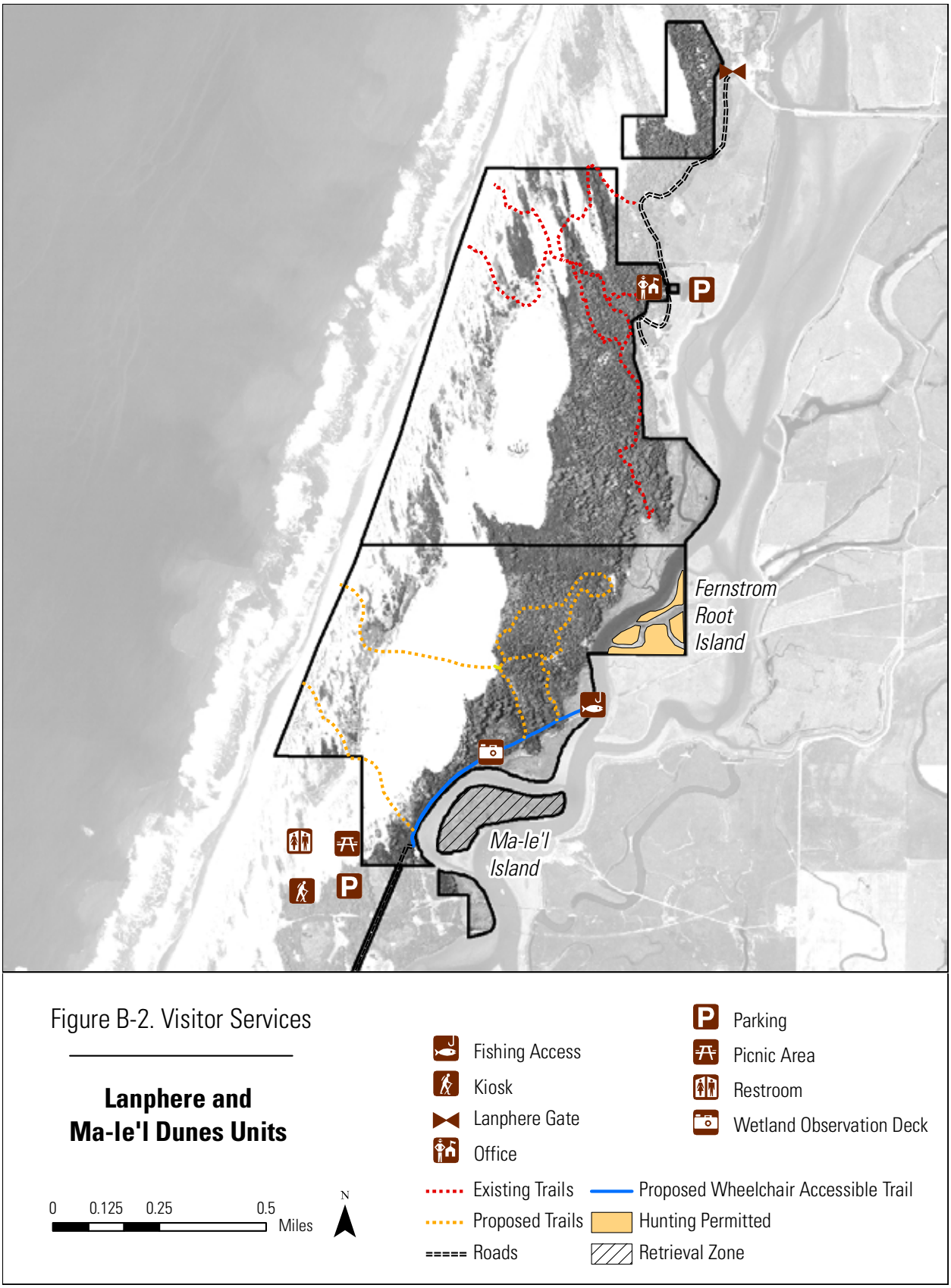

Figure B–2. Visitor Services Alternative—Lanphere and Ma-le'l Dunes Units.

Appendix C: Draft Waterfowl Hunt Plan

DRAFT WATERFOWL HUNT PLAN

Humboldt Bay National Wildlife Refuge
Humboldt County, California

November 2008

Youth Hunters at the Salmon Creek Unit of Humboldt Bay NWR. Photo: USFWS

I. Introduction

Humboldt Bay National Wildlife Refuge (HBNWR) is located in Humboldt County, California, with refuge units within and adjacent to Humboldt Bay and associated watersheds (Figure 1). The approved refuge boundary is roughly defined by Hookton Road on the south, Mad River County Park on the north, Highway 101 and Mad River Slough on the east, and the Pacific Ocean on the west (Figure 1). Topography in the general region of Humboldt Bay is characterized by steep mountains and narrow valleys, which are typical of the coast ranges of northern California. Most of these uplands are covered by dense forests of redwood and Douglas-fir. Humboldt Bay consists of three primary sections: Arcata Bay in the north, Entrance Bay the middle and South Bay. Below are brief descriptions of each section as described in the Humboldt Bay Management Plan (HBHRCD 2007):

Arcata Bay
Arcata Bay is bounded by the Samoa Peninsula and the North Spit to the west; the Arcata Marsh and Wildlife Sanctuary, Arcata Bottoms, and City of Arcata to the north; Bayside Bottoms and Bracut areas to the east; and the City of Eureka and Woodley Island to the south. Arcata Bay covers ~ 13 square miles and is ~ 5.8 miles at its longest and 4.3 miles at its widest points. This portion of the bay is generally shallow, with over half of the area exposed at low tides. These tidal flats are incised by several deeper channels, as well as numerous shallow channels. Most of the mud-silt bottom of Arcata Bay is exposed on average low tides, creating habitat for foraging shorebirds.

Entrance Bay
Entrance Bay is ~ 5 miles long and generally less than a mile wide. It is bounded by the North Spit on the west, Arcata Bay to the north, the City of Eureka and Elk River Spit and wetlands to the east. It includes Woodley Island and Indian Island and the City of Eureka waterfront. Entrance Bay, with a mostly sand bottom, lacks the expansive mudflats found in Arcata Bay and South Bay.

South Bay
South Bay covers ~ 7 square miles and is ~ 4 miles at its longest and 2.5 miles at its widest points. It is bounded by the South Spit on the west side, Entrance Bay on the north, lands and waters of the Humboldt Bay National Wildlife Refuge (HBNWR) on the southeast, and Table Bluff to the southwest. Like Arcata Bay, much of the South Bay is occupied by broad expanses of tidal flats incised by numerous small, shallow channels and one deep-water channel which serves the Fields Landing and King Salmon areas and is maintained for navigation. South Bay supports eelgrass over much of its silt bottom, with the higher elevations of the east and south sides exposing bare (or algae covered) mudflats on most low tides.

In 1971, the Humboldt Bay National Wildlife Refuge was established to conserve important habitat for the great diversity of animals and plants that occur in the Humboldt Bay area. Humboldt Bay NWR has several different units totaling almost 3,500 acres. These units consist of a mixture of mudflats, estuarine eelgrass meadows, salt marsh, brackish marsh, seasonally flooded freshwater wetlands, riparian wetlands, streams, coastal dunes, and forest. These habitats support over 316 species of birds and 40 species of mammals. The refuge also provides habitat for ~ 100 species of fish and marine invertebrates, many of which contribute to sport and commercial fisheries, including steelhead, Coho and Chinook salmon, and Dungeness crab.

Concentrations of migratory waterbirds, especially shorebirds, occur in the fall, winter, and spring. In winter, it is not unusual for over 100,000 birds to use Humboldt Bay as a feeding or resting site. Key habitats for these waterbird concentrations are eelgrass beds and extensive mudflats. These also make the bay an important spawning, nursery, and feeding area for fish and other marine life. Complimentary to the bay habitats are thousands of acres of seasonal wetlands (mostly former tidal wetlands that have been diked off for over a century).

Endangered or threatened species include: brown pelican, snowy plover, Chinook and Coho salmon, steelhead, tidewater goby, Humboldt Bay wallflower, and beach layia. The Lanphere Dunes and Ma-le'l Dunes Units protect endangered and rare plants within rare dune plant communities. The refuge contains one of very few dune systems in which the underlying processes are intact.

The Humboldt Bay watershed is considered the most important wintering waterfowl habitat between San Francisco Bay and the Columbia River (PCJV 2004). Many species of waterfowl use habitats on Humboldt

Bay NWR, particularly for resting and foraging during their annual migrations. Seasonally common waterfowl that use Humboldt Bay NWR and nearby wetlands and agricultural short-grass pastures during migration include: northern pintail, northern shoveler, American wigeon, green-winged teal, mallard, bufflehead, scaup, tundra swan, Pacific brant, Aleutian and cackling geese, and non-native Western Canada geese, which were introduced to the area in the 1980s. Larger, seasonally common waterfowl such as Pacific brant, Canada geese, and cackling geese are highly valued by sport hunters and by wildlife watchers alike. This refuge has also been described as one of the most important areas in the United States south of Alaska for Pacific brant. This is especially true during the spring when the bay is a key staging area for more than 60 percent of the flyway Pacific brant population prior to their return to arctic nesting grounds. Similarly, the northcoast of California and southern coast of Oregon are key spring staging areas for the growing population of Aleutian cackling geese.

A young hunter enjoys a hunt with his father and dog at the Salmon Creek Unit. Photo: USFWS

The refuge is a focal point for humans and wildlife. Currently, visitors may tour the Salmon Creek Unit of the Refuge, including the Shorebird Loop Trail and Richard J. Guadagno Headquarters and Visitor Center from 8:00 a.m. to 5:00 p.m., Federal holidays excepted. The Hookton Slough Unit, including the Hookton Slough Trail and Non-Motorized Boat Ramp, is open 7 days a week from sunrise to sunset. Special tours and other environmental education programs are available on request. More than 25,000 people visit the refuge annually. The refuge hosts a variety of special events such as the Goose Flyoff and Family Fun Weekend, the California Waterfowl Association (CWA) Outdoor Adventure Day and is a partner in Godwit Days. There are many opportunities for wildlife-dependent uses at the refuge, including wildlife observation, environmental education and interpretation, waterfowl hunting, wildlife photography, and fishing.

The purpose of this hunt plan is to outline how the hunting program is operated at Humboldt Bay NWR. In addition, this plan documents how the refuge will provide safe hunting opportunities, while minimizing conflicts with other priority wildlife-dependent recreational uses.

Humboldt Bay NWR will have parts of eight units open to hunting under this plan: Ma-le'l Dunes (Fernstrom-Root Island), Jacoby Creek, Eureka Slough, Table Bluff, White Slough (Egret Island), Hookton Slough (Teal Island), and Salmon Creek (Figure C-1). All units associated with Humboldt Bay are potentially hazardous due to deep mud, volatile wind conditions, underwater hazards, and changing tides. Caution should be used when hunting any unfamiliar areas of the bay or the refuge. Only safe, reliable boats should be used. Possession of all boater safety gear required by the United States Coast Guard is mandatory to use a boat in any refuge units.

Hunting of waterfowl, coots, common moorhens and snipe is currently permitted only in designated areas of the refuge and is governed by Federal and State regulations. The Sport Hunting Decision Document Package that currently dictates all hunting occurring within HBNWR was approved February 27, 1990.

II. Conformance with Statutory Authorities

Humboldt Bay National Wildlife Refuge was established by authority of the Migratory Bird Conservation Act of February 16, 1929, as amended, and the Migratory Bird Hunting and Conservation Stamp Act of March 16, 1934, as amended. The purpose of Humboldt Bay NWR is to protect and enhance wetland habitats in and adjacent to Humboldt Bay for a wide variety of migratory waterbirds, especially Pacific brant. National Wildlife Refuges are guided by the mission and goals of the National Wildlife Refuge System (NWRS), the purposes of an individual refuge, Service policy, laws and international treaties. Relevant guidance includes the National Wildlife Refuge System Improvement Act of 1997, Refuge Recreation Act of 1962, and selected portions of the Code of Federal Regulations and Fish and Wildlife Service Manual.

The National Wildlife Refuge System Improvement Act of 1997 provides guidelines and directives for the administration and management of all areas in the NWRS. The Act also defines six wildlife-dependent priority public uses, including hunting, that refuges should strive to provide when compatible with the purposes of the refuge and the mission of the NWRS. A strong historical precedent for hunting on refuge lands exists as much of the lands and waters acquired by the refuge were hunted for migratory birds prior to FWS acquisition. One of the major contributors to the National Wildlife Refuge System has been the Federal Duck Stamp Program, among the most successful conservation programs ever initiated. Waterfowl hunters are required to purchase a duck stamp to hunt waterfowl. More than 1.5 million stamps are sold each year. Over the years, sales of duck stamps have led to the purchasing of over five million acres of wildlife habitat for the NWRS. Hunting is permitted in accordance with State and Federal regulations and seasons to ensure that it will not interfere with the conservation of other wildlife and fish and their habitats.

The Office of Migratory Bird Management sets the general frameworks through their annual regulations permitting the hunting of migratory birds. The individual States set seasons within those frameworks. If necessary, the Service develops regulations that may be more restrictive that State hunting regulations in order to protect resources on a refuge-by-refuge basis, termed "refuge-specific regulations" (i.e., species or days hunted). Otherwise, the Service observes State regulations on all refuges open to hunting.

The estimated annual cost to administer the hunt program is $8,500. Within the annual HBNWR budget the necessary funds are available for this work. The refuge also participates in the Recreational Fee Program, which offsets some costs of the hunting program. Therefore, the hunting of migratory ducks, geese, coots, common moorhens and snipe is in compliance with the Refuge System Administration Act of 1966 as amended by the National Wildlife Refuge System Improvement Act of 1997 (16 U.S.C. 668dd-ee), the Refuge Recreation Act of 1962 (16 U.S.C. 460k), and all other governing statutory authorities.

III. Statement of Objectives

The goal of the National Wildlife Refuge System is: To provide the general public with a quality wildlife-oriented recreational experience and an opportunity to utilize a renewable natural resource. The objectives of the Humboldt Bay NWR Waterfowl Hunt Plan are to:

1. Provide a quality wildlife-dependent recreational experience, using a renewable natural resource.
2. Promote hunter education and ethics through information and enforcement of hunting regulations and compliance with compatibility determinations.
3. Promote mobility-impaired access by providing designated mobility-impaired accessible blinds.
4. Promote opportunities for youth and junior hunters by providing designated hunts for youth and junior hunters.

For the goals of HBNWR as established by the refuge Comprehensive Conservation Plan (CCP) see Chapter 5 of the CCP.

Therefore, with existing staff and resources, the hunt program would contribute to CCP Goal 5 by providing safe, high quality hunting opportunities without impeding the ability of the refuge to achieve remaining refuge goals. This plan would allow waterfowl hunting on designated refuge units under State waterfowl regulations as well as regulations set by the U.S. Fish and Wildlife Service specifically for HBNWR. In addition, hunter education, ethics, and opportunities for youth and mobility-impaired hunters are emphasized as part of the refuge hunt program.

IV. Assessment

Pacific flyway waterbirds migrating along the coast use Humboldt Bay as a feeding and resting area during fall, winter and spring. Humboldt Bay is a key spring staging area for arctic–bound Pacific brant, which feed almost entirely on eelgrass south of their breeding grounds and are therefore limited to areas on the flyway which provide this habitat. Humboldt Bay is also a key spring staging area for tens of thousands of Aleutian cackling geese, which utilize the pasturelands found on Humboldt Bay NWR and surrounding lands.

Based on decades of winter waterfowl survey data; the combined dabbling and diving duck numbers in the Humboldt Bay area range from 10,000 to 40,000 from fall through spring. Species which occur in the greatest numbers are American wigeon, bufflehead, green-winged teal, scaup, scoters, and northern pintail. Coots and snipe are also seasonally abundant in the area, while common moorhens are listed in local field guides as "accidental occurrences".

Are wildlife populations present in numbers sufficient to sustain optimum population levels for priority Refuge objectives other than hunting?
Yes, wildlife populations are present in sufficient numbers to sustain optimum population levels for priority refuge goals other than hunting (See Section III for a list of refuge goals). The refuge harvest regulations follow those set by the State, which are in turn set within Federal guidelines.

Under Federal law established by international treaties with Canada, Mexico and other countries with whom the United States of America share migratory birds, the Service has ultimate responsibility for regulating migratory bird hunting nationwide. The Service establishes frameworks that govern all migratory bird hunting in the United States through a regulatory process that begins each year in January and includes public consultation. Within the boundaries established by those frameworks, State wildlife commissions have the flexibility to determine season length, bag limits, and areas for migratory game bird hunting.

Resident and migratory birds, wildlife and fish would be minimally impacted by the hunt program because of the limited days hunting occurs on the refuge and the percentage of refuge lands closed to hunting hunting and other uses. Other effects considered within the context of the refuge hunt program include such things as: disturbance to non-hunted species, take of non-target species, presence of lead from previous hunts, and crowding of birds into closed zones causing disease. While all of these issues may have had substantive effects on waterfowl at different locations around the country at one time or another, none of these issues taken separately or cumulatively has ever had a significant impact on local wintering waterfowl populations. This is likely due to the large diversity and spread of wetlands in the area from Eel River to Mad River which allows birds ample habitat to distribute themselves in.

Therefore, a waterfowl hunt can be sustained that does not impact populations of resident and other migratory birds, wildlife and fish and allows the refuge to contribute to the goals listed in Section III.

Is there competition for habitat between target species and other wildlife?
Possibly; while each species occupies a certain niche, there is a finite amount of space available to satisfy various habitat requirements for water, food, cover, and roosting areas. Management of seasonal and permanent wetlands is currently guided by the goals and management objectives of the CCP. These goals and objectives would ensure that habitats would be managed to provide for a diverse number of species including waterfowl, shorebirds, and other wading birds.

Are there unacceptable levels of predation by target species on other wildlife forms?
No, some waterfowl species feed on fish and invertebrates as well as plant seeds and tubers, but it is not likely that they feed at levels that impact other wildlife on the refuge.

V. Description of Hunting Program

The hunt program at Humboldt Bay NWR is small compared to many other National Wildlife Refuges in California such as Sacramento NWRC or Tule Lake NWR. However, Humboldt Bay NWR provides a unique public land hunting opportunity for the citizens of California and Humboldt County in general and specifically for the cities of Eureka, Arcata and Fortuna. The lottery draw type of hunt offered at the Salmon Creek

Unit of HBNWR is different than the other public lands open to hunting in the area, which are currently managed as free-roam hunt areas. During the 2006/2007 hunting season a total of 1187 hunters took 2967 ducks at the Salmon Creek Unit of the refuge for a 2.5 bird average. The refuge maintained a greater than two birds per hunter average for the 2001 to 2006 hunting seasons, indicating a high quality hunt. The three most commonly harvested species at the Salmon Creek Unit are green-winged teal, American wigeon and northern shoveler. Western Canada geese, Aleutian cackling geese and cackling geese are all also regularly harvested at the Salmon Creek Unit but in much smaller numbers. Use and harvest data is not available for other areas on the refuge open to hunting.

The refuge also allows hunting at the Jacoby Creek, Eureka Slough, Table Bluff, South Bay, and Salmon Creek Units; as well as the White Slough/Egret Island, Hookton Slough/Teal Island areas in South Bay; totaling 840 acres. Under this plan, the portions of Fernstrom-Root Island owned by FWS would be opened to hunting; totaling 10 acres. Therefore, ~25 percent of the properties owned by the Service is or will be open to hunting. The remaining lands owned by the refuge are not suitable for a hunting program because they are: located too close to residential areas or highway/freeway areas, used as sanctuary areas or are currently open or planned for other priority wildlife-dependent visitor uses including wildlife observation, environmental education, interpretation, and photography. Listed below are brief descriptions of each refuge unit open to hunting:

North (Arcata) Bay Units

Ma-le'l Dunes Unit (Fernstrom-Root Island)

Fernstrom-Root Island is a 10 acre island in Mad River Slough consisting of high salt marsh. Mad River Slough is north of Highway 255 and lies between the dunes and the Arcata Bottoms. Mad River Slough is navigable water and therefore overwater hunting is permitted. Ma-le'l Island, south of Fernstrom-Root Island, is designated as a retrieval only area. The islands are accessible by boat only and FWS only owns part of the island. The area receives light to moderate use during the early part of the waterfowl season.

Jacoby Creek Unit

Jacoby Creek Unit is ~ 73 acres located in northeastern Arcata Bay south of the Arcata Marsh. It is characterized by mudflat and tidally influenced salt marsh habitat. The dominant plants found in the salt marsh habitats of Humboldt Bay are Spartina (*Spartina densiflora*) and pickleweed (*Salicornia* spp.). The Jacoby Creek Unit includes the mouth of Jacoby Creek. Jacoby Creek Unit is hunted most frequently during the early waterfowl season, when birds are attracted to the freshwater coming out of the creek. During the latter half of the waterfowl season hunting pressure is generally low.

Eureka Slough Unit

Eureka Slough is ~ 86 acres of undiked salt marsh and mudflat in southeastern Arcata Bay. The area is difficult to access and receives very little hunting pressure throughout the season.

South Bay Areas and Units

White Slough Unit/Egret Island

White Slough is diked on both sides, with very little cover on either shore in South Bay. Egret Island is a two acre low salt marsh island. This island is boat access only and is inundated by high tides on a regular basis. The area also includes several other small salt marsh islands. The majority of the White Slough Unit is diked and the dikes and all areas landward of the dikes are closed to hunting due to the proximity of Highway 101. The open water area is difficult to safely access and to navigate at low tides. The area receives moderate hunting pressure during the early part of the hunting season.

Salmon Creek Unit

The hunt area at Salmon Creek is ~ 320 acres and consists of a mixture of short-grass pastures, seasonal and permanent freshwater wetlands, brackish wetlands and numerous brackish sloughs. Salmon Creek features a regulated, spaced blind hunting program and is part of the Recreation Fee Permit program. Salmon Creek receives the most hunting pressure of all the refuge units.

The Salmon Creek hunt program can currently accommodate a maximum of 60 hunters in the field at one time, with potential for 120 hunters or more during a hunt day with 100 percent blind re-fills. Blinds areas

may have one or more standup blinds, pit blinds, or both. Hunting occurs from 15 blind areas, separated to ensure a safe hunting experience.

Hookton Slough Unit/Teal Island

The area of Hookton Slough bayward of the dikes is navigable water and is open to hunting on overwater hunting days (see California Department of Fish and Game Regulations for definition of overwater hunting days). The area consists of a deep tidal channel with steep dikes on both sides, several salt marsh islands, and remnant dikes of Teal Island in South Bay. Teal Island is not a true island; rather it consists only of the remnants of an exterior dike built around the historical salt marsh island. The dike consists of rapidly eroding bay mud and in some places dense coyote brush (Baccharis pilularis). There are also several low marsh islands created by dense mats of Spartina associated with Teal Island. Most hunting occurs from the dike. Teal Island receives moderate hunting pressure during the entire waterfowl season. The mainland dikes and all areas landward are closed to access from the slough. Hookton Slough receives light hunting pressure during the entire waterfowl season.

Table Bluff Unit

Table Bluff is an ~160 acre unit consisting of mudflat and a muted tidal marsh. Located in the southwest corner of South Bay, a breached dike and an adjacent shoreline grading from dune to brackish marsh make the area is difficult to access by boat or on foot. The channels that lead to the area are impassable by foot during high tide. The area receives light hunting pressure throughout the season.

Youth hunters enjoying the morning hunt. Photo: USFWS

South Bay Unit

This unit consists of tidal flats and eelgrass primarily in areas west and north of Teal Island and immediately west of the north end of the White Slough Unit. Most of South Bay is prime habitat for Pacific brant as it is covered with eelgrass, their primary food. Most brant hunting takes place either from the bay shoreline of South Spit (which is owned by CDFG but managed by BLM), or out on the bay itself on overwater hunt days by hunters using scull or layout boats. The brant season is generally occurs during the month of November.

A. Areas of the Refuge that support populations of target species:

All hunted species are found in appropriate habitats throughout the refuge. Waterfowl feed, loaf, and rest on the refuge primarily from fall through spring with some species nesting during spring and summer. The most common breeding waterfowl on the refuge are Western Canada geese, mallards, and gadwall. Waterfowl utilize the managed permanent and seasonal wetlands, flooded pastures, ponds, sloughs, intertidal mudflats, salt marsh and other bay habitats found throughout all the units of the refuge.

B. Areas to be newly opened to the public:

1. Fernstrom-Root Island

Hunting on the portions of Fernstrom-Root Island owned by FWS will be opened to hunting according to this plan. Fernstrom-Root Island is located in Mad River Slough north of Ma-le'l Island and the water pipe crossing (Figure 4). Ma-le'l Island, adjacent to Fernstrom-Root Island and the Hop'o'y Trail will be open for retrieval only.

2. Salmon Creek Unit
There is currently a regularly scheduled youth hunt every year after the end of the regular waterfowl season in concurrence with California state regulations. The event is very well attended and adult hunters help out in many different ways, from guiding youth hunters whose parents have no hunting experience to cooking breakfast for youth hunters returning from the field. In order to increase opportunity for youth hunters, the refuge will open a youth hunt in concurrence with State regulations following the close of waterfowl season and extending for one day. Youth hunters must be 15 years of age or younger and accompanied by a non-hunting adult 18 years of age or older.

The refuge will also open two junior hunts. The junior hunts will occur during the regular waterfowl season on the last Thursday in December and the first Thursday in January, aligning with the regular holiday school break to maximize junior hunter opportunities at the refuge. Junior hunt days will be managed similar to the existing youth hunt held at the end of the regular season. This measure will help maintain a high quality hunt and prevent conflicts with other wildlife dependent recreation uses. Junior hunts will be open to hunters 16 years of age or under possessing a valid junior hunting license. All hunters age 16 or younger must be accompanied by a non-hunting adult 18 years of age or older. All 16 year old hunters with a junior hunting license are required to have in possession a signed Federal duck stamp.

C. Species to be taken, hunting periods:
The waterfowl hunt program at HBNWR takes place during the normal State waterfowl hunting season, typically from the third weekend in October to the last weekend in January as set by the State Commission in accordance with Federal guidelines. Shooting is permitted from ½ hour before Eureka legal shoot time until 3:00 pm at the Salmon Creek Unit, and ½ hour before Eureka legal shoot time until sunset at all other units open to hunting. Only ducks, geese, coots, common moorhens and snipe are permitted to be taken. Common duck species include American wigeon, green-winged teal, northern shoveler, northern pintail, mallard, bufflehead, greater and lesser scaup, scoters, ruddy duck and gadwall. Common goose species include Western Canada, cackling and Aleutian cackling geese.

D. Justification for permit, if one is required:
A permit is required at Salmon Creek Unit to monitor hunter use, levels of waterfowl harvest and to collect a fee. The fee is used to fund the staff required to maintain a high quality managed hunt.

E. Procedures for consultation and coordination with the State:
The following procedures are done:
Refuge staff meets with CDFG, BLM and FWS managers and wardens before and after hunt season to discuss the hunting season and possible improvements for the coming year.

F. Methods of control and enforcement:
The following methods are used to control and enforce hunting regulations:
- Hunt area boundary signs will be posted at all units.
- At the Salmon Creek Unit hunters are assigned a spaced blind and must hunt within a designated "blind zone." Blind zones are both described in written terms and shown on a map in a document provided to all hunters at the check station, the refuge web site and in the Visitor Center.

- Humboldt Bay NWR has produced a brochure and a map that clearly illustrates hunt areas. The map and brochure is available at the Richard J. Guadagno Headquarters and Visitor Center, the hunter check station and the refuge website.
- Hunters are randomly checked by a cooperative of law enforcement agencies (FWS, BLM, CDFG) for compliance with State and Federal laws as well as refuge-specific regulations.
- A hunter check station is located on the Salmon Creek unit and staffed by refuge staff, volunteers and/or California Waterfowl Association (CWA) staff/volunteers to conduct the lottery draw, assist hunters, and monitor the hunt.

G. Funding and staffing requirements:
Administering the hunt program at Salmon Creek Unit requires staff to randomly select hunters through a lottery draw system, check in hunters, record harvest data, prepare and construct blinds prior to the season, enforce regulations, monitor impacts to other wildlife and ensure safety. The orientation/hunter check-in and

administering of the hunt requires the Wildlife Biology Aide to work about 8 hours for every hunt day. An estimated annual expense of $6,000 is required to pay the Wildlife Biology Aide.

Estimated annual costs include ~ $6,000 to fund the Visitor Services/Wildlife Biology Aide position, $4,000 for other staff and law enforcement, $2,000 to maintain roads and trails and improve the hunt area (signs) and $500 for Hunt Area habitat improvement for a total estimated annual expenditure of $12,500. Due to the high costs of this program, the refuge participates in the Recreational Fee Program, which results in an average yearly fee collection of $3,700 from ~ 1000 refuge hunters.

H. Consideration of mobility-impaired hunters:

Providing opportunities for mobility-impaired hunters is one of the goals of the waterfowl hunting program at the refuge. Specifically, the program:

- Provides a blind area accessible to mobility-impaired hunters on the Salmon Creek Unit for the exclusive use of mobility-impaired persons and their hunting partners.
- Ensures parking areas leading to blinds are accessible for persons in wheelchairs, or using walkers.
- Provides a discounted permit fee for mobility-impaired hunters.
- A "mobility impaired hunter" is defined as any person who has been issued a "DMV Disabled license plate, or a permanent parking placard identification card," or a valid "Mobility Impaired Disabled Persons Motor Vehicle Hunting License" (FG Form 1460). The blue plastic "Disabled Parking Placard" may not be substituted for the required "Identification card" which bears the name of the mobility impaired person. Disabled hunters must provide the registration certificate for DMV issued disabled license plates.

VI. Measures Taken to Avoid Conflicts With Other Management Objectives

The hunt program as outlined was designed to minimize or eliminate any conflicts with other management objectives. These objectives include providing the public with other wildlife-dependent opportunities such as wildlife observation and photography, and providing habitat for other wetland-dependent species such as shorebirds, grebes, non-hunted migratory waterfowl, raptors and Federal and State special status species such as the brown pelican.

A. Biological Conflicts

The current and proposed hunt plan is designed to minimize or avoid potential biological conflicts with other wetland-dependent species through education, monitoring, and limiting hunt days and times. Potential biological conflicts include flushing other migratory and resident birds from areas being hunted or the take of non-target species either by mistake or willfully. Portions of the Salmon Creek, Hookton Slough and White Slough Units are closed to provide waterfowl secure resting areas where they are not hunted. Portions of the Hookton Slough and White Slough Units are not open to hunting due to proximity of homes, public roads, trails or sanctuary areas. Hunting on the Jacoby Creek and Eureka Slough Units is limited to boat access to that area bayward of posted signs due to an absence of other safe access routes, proximity of public roadways and to prevent damage to sensitive salt marsh plants.

The portions of the refuge being opened to the hunting of migratory birds through this plan are not typically used by Pacific brant. The only federally listed species that may be affected by hunting is the endangered brown pelican. However, brown pelicans rarely use the units where hunting occurs and take due to hunter identification mistakes is very unlikely. Therefore, impacts on threatened and endangered species would be minimal.

International treaties for conservation of migratory birds mandate that protecting and maintaining overall populations be given a higher priority than harvesting of waterfowl. The Fish and Wildlife Service, State wildlife agencies, academic institutions, and federal and provincial governments in Canada have long-term cooperative programs that monitor breeding population status, harvest levels, production, migration, and other parameters utilized for regulating harvests. The process of regulating waterfowl harvests involves a lengthy sequence of public involvement and decision-making by the Service, State wildlife agencies, and the Canadian and Mexican governments during the regulatory cycle. The process involves assessment of waterfowl populations, publication of Federal Register notices, and numerous meetings by Waterfowl Flyway Councils and the Service Regulations Committee. It culminates in regulations being set at the flyway level (season lengths, daily bag limits, and outside dates for the earliest opening and latest closing dates for a hunting season) and special regulations at the State level (e.g., split seasons, harvest zones, special seasons, area closures) which are in turn followed by the NWRS when administering hunt programs.

B. Public Use Conflicts

The waterfowl hunting program is organized to have minimal to no impact on other public uses at the refuge by implementing the following measures:

- Public uses on the entire refuge, especially the Salmon Creek Unit, are zoned both temporally and spatially during the entire hunting season to avoid conflict and provide for public safety.
- Signage and brochures indicate hunt area boundaries.
- Only pedestrian traffic is allowed for all but mobility-impaired hunters going to and from hunting blinds at Salmon Creek Unit.
- Dogs used for retrieving waterfowl must remain in control of the owner at all times.
- Many portions of the refuge are open year round to other wildlife-dependent uses such as wildlife observation, photography, fishing, environmental education and interpretation.
- Cease fire is set at 3:00 pm at the Salmon Creek Unit, providing the non-hunting public times when no hunting or shooting is occurring at the refuge during hunt days.
- The refuge will post educational materials on hunting and avoiding conflict between user groups at the Male'l Dunes north boat ramp.

VII. Conduct of the Hunt

A. Refuge-Specific Hunting Regulations (All Units)

The hunting of geese, ducks, coots, common moorhens and snipe during the waterfowl season as determined by the State on designated areas of the refuge is subject to the following conditions:

- Hunters must possess a valid hunting license, an affixed State duck stamp, a signed Federal duck stamp and an affixed Harvest Information Program (HIP) stamp.
- All hunters age 17 and under must be accompanied by an legally responsible adult aged 18 or over.
- Hunting hours will coincide with California State Regulations, except at the Salmon Creek Unit where hunting hours end at 3:00 pm.
- Non-Toxic shot is required on all refuge units. Shot size is restricted to no larger than "T" for steel shot and "BB" for all other non-toxic shot.
- No person may build or maintain fires.
- When not hunting, dogs must be in vehicles or on a leash and kept under control at all times. Dogs are not allowed to enter closed areas for any reason.
- Hunters may use only portable blinds or temporary blinds constructed of natural materials. Hunters must dismantle or remove all temporary blinds from the refuge after each days hunt.
- Vehicle parking is permitted only in designated areas.
- Hunters must remove all decoys, shotshell casings, personal equipment and refuse from the refuge following each day's hunt. Littering is unlawful and will be prosecuted.
- Possession or use of alcohol is prohibited on National Wildlife Refuges
- All weapons must be unloaded to and from the hunting area.

B. Unit- Specific Regulations

1. Salmon Creek Unit

Hunting at the Salmon Creek Unit generally occurs two days per week, Tuesday and Saturday from ½ hour before sunrise until 3:00 pm during the entire regular hunting season. During check in hunters will receive a daily hunting permit. The hunting permit must be in possession of the hunter while in the field, and hunters must return their permits and report hunting results at the check station by 4:30 PM.

Use of hunting dogs for retrieval of birds is allowed and strongly encouraged, however dogs must be under control of their owners at all times. Failure to follow any State, Federal or refuge-specific regulations may result in eviction from the refuge or a citation.

A mobility-impaired ("disabled") blind is available for mobility-impaired hunters. A "mobility-impaired (disabled) hunter" is defined as: Any person who has been issued a "DMV Disabled license plate, or a permanent parking placard identification card," or a valid "Mobility Impaired Disabled Persons Motor Vehicle Hunting License" (FG form 1460). The blue plastic "Disabled Parking Placard" may not be substituted for the required "Identification card" which bears the name of the mobility-impaired person. Disabled hunters must provide the registration certificate for DMV issued disabled license plates.

Hunting is permitted from designated blind zones (Figure 3, Table 1). Free roam hunting is not allowed. Hunters are required to remain within designated blind zones, except for retrieving downed birds. Hunters may possess and use, while in the field, no more than 25 shells per hunter, per day. Firearms must be unloaded while being transported between parking areas and hunting sites. A firearm is deemed loaded when there is a live cartridge or shell in, or attached in any manner to, the firearm, including, but not limited to, the firing chamber, magazine, or clip thereof attached to the firearm. (Penal Code & 12031(g).).

2. Teal Island Area
Teal Island is open to hunting Wednesdays, Saturdays, Sundays, holidays and the opening and closing days during the prescribed open season as per Section 3681 of the California Fish and Game code (Figure 2). Teal Island is designated as boat in access only. Hunting is permitted from the dikes or from a boat blind. Teal Island may not be accessed for hunting from the Hookton Slough boat dock to conserve the integrity of refuge closed zones adjacent to Hookton Slough. Fields Landing is the nearest public boat launch.

3. Hookton Slough Area
Hookton Slough is open to hunting Wednesdays, Saturdays, Sundays, holidays and the opening and closing days during the prescribed open season as per Section 3681 of the California Fish and Game code. Hookton Slough is designated as boat in access only (Figure 2). Retrieval is not allowed in the Salmon Creek Unit. Boat access for hunting is not allowed from the Hookton boat dock; Fields Landing is the nearest public entry point. No shooting is allowed within 150 yards of Hookton non-motorized boat dock. All other areas of Hookton Slough Unit are closed to hunting.

4. White Slough/Egret Island Area
This area is open to hunting Wednesdays, Saturdays, Sundays, holidays and the opening and closing days during the prescribed open season as per Section 3681 of the California Fish and Game code. White Slough and Egret Island are designated as boat in access only; Fields Landing is the nearest public boat launch. Hunting and retrieval are allowed on all of the salt marsh islands but access and hunting is not allowed on any of the dikes and lands inside the dikes (Figure 2). Retrieval is not allowed in the Salmon Creek Unit. Shooting is not allowed within 150 yards of Highway 101 or Tompkins Hill Road.

5. Table Bluff Unit
Table Bluff Unit is open to free roam hunting 7 days a week (Figure 2). Hunters may access the area either by boat or by walking in.

6. South Bay Unit
The South Bay Unit is open to hunting concurrent with overwater hunt days as described in CDFG Regulations.

7. Eureka Slough Unit
The Eureka Slough Unit is open to free roam hunting 7 days a week, but the property is boat in access only (Figure 4). Woodley Island Marina or the boat launch behind the Target store, located in east Eureka, are the nearest public boat launches.

8. Jacoby Creek Unit
Jacoby Creek is open to free roam hunting 7 days a week, but the property is designated as boat in access only. No parking is allowed on FWS property. No trespass onto the banks of Jacoby Creek is permitted (Figure 4). Parking along Highway 101 is not recommended and the FWS assumes no responsibility or liability for hunters that choose to park along Highway 101. The Arcata Marsh has the closest public boat launching point.

9. Fernstrom-Root Island (Ma-le'l Dunes Unit)
Fernstrom-Root Island is open to hunting 7 days a week. Hunting but no blind construction is allowed on the portion of the Fernstrom-Root Island owned by FWS. Ma-le'l Island is designated as a retrieval only area (Figure 4). Hunters can access Mad River Slough from the boat ramp on Lanphere Road and from Samoa Boulevard to reach Fernstrom-Root Island.

10. General Regulations
California Department of Fish and Game Code 3681: Interpretation—This Fish and Game Code allows for hunting in any manner below the incoming or outgoing tidewaters edge or from any blind, boat, floating device, island, islet or exposed tidal flat on the waters of Humboldt Bay, including all rivers, streams and sloughs emptying into the bay on Wednesday, Saturdays, Sundays, Federal holidays, and the opening and closing days of the season.

C. Anticipated Public Reaction to the Hunt

Most hunters support the expansion and continued existence of a hunting program within the Humboldt Bay NWR. Hunting and fishing have strong traditional use in the Humboldt Bay area. During the comment period for the CCP in February 2007 a number of opinions from the public were heard. The majority of the comments received supported increasing access to the refuge and opening as much of the refuge to hunting as possible. There was also some opposition to allowing existing or additional hunting on the refuge.

D. Hunter Application and Registration Procedures at Salmon Creek Unit

A permit is required to hunt at the Salmon Creek Unit. The refuge check station opens two hours before Eureka legal shoot time. A random drawing for available permits takes place at the check station 1 ½ hours prior to shoot time before each daily hunt. Hunters must be present to be eligible for the draw. The refuge's controlled waterfowl hunt is operated under the Recreation Fee Program. The permit fee for hunters between the ages of 16 and 61 is currently $5.00 per person or $10.00 per blind, whichever is greater. There is no fee for junior hunters (age 16 and under), but they must be accompanied by an adult who will assume legal responsibility of the junior hunter. Holders of Golden Age (62 and older) or Golden Access (disabled) Passports pay half price.

E. Description of Hunter Selection Process at Salmon Creek Unit

1. Sign in procedure:
Waterfowl hunters or groups of hunters are required to sign in at the check station in order to participate in that day's hunt. To sign in, hunters must clearly write the first and last names of all persons in their hunting party (up to four people) on a 4X6 draw application card and turn the card in to the check station attendant. When the card is turned in the hunters will be given a corresponding number which will be used in the random lottery draw for available hunting blinds. Hunters must be present in order to participate in the lottery draw.

When the lottery draw is complete and the numbers are posted in the order they were drawn, the check station attendant will begin filling blinds and checking in hunters in the order of the lottery draw. These numbers are also used to prioritize re-filling blinds. Hunters must present a filled out permit card and their hunting license to the check station attendant. The permit must have the assigned blind number written on the permit to be valid. Hunters must have an affixed State duck stamp, an affixed HIP program stamp and be in possession of a Federal duck stamp signed by the hunter in order to hunt.

2. Joining up:
The first fifteen (15) lottery numbers drawn may join with any other of the first fifteen (15) draws as long as there are no more than four (4) hunters per blind.

Waterfowl hunters or groups of hunters chosen after the first fifteen (15) must wait until their number is called in order to pair with other hunters. The check station attendant will continue to call numbers until all blinds are occupied. Once all blinds are occupied, no more numbers will be called.

3. Re-filling:
At 10:00 AM the check station attendant will assign priority numbers for re-filling available blinds based on the morning random draw and those present. Hunters must be present in order to maintain their position from the morning draw. If a hunter was not present at the morning draw they would sign in according to the "sign in procedures" listed above in Section A. Hunters would then be given a re-fill number after all other priority hunters have either taken a blind or declined to accept a blind.

When a blind has been vacated by all hunters and those hunters have checked out with the check station attendant, the blind is available to be re-filled. Re-fill #1 has the option of taking the blind or not taking the blind without losing position in line. If re-fill #1 does not take an available blind, the choice goes to priority two with the same options, so on and so forth.

F. Media Selection for Announcing and Publicizing the Hunt Plan

The hunt plan will be announced in the media as part of the refuge CCP process, and will be released as an amendment to the HBNWR CCP.

G. Description of Hunter Orientation

Orientation at the Salmon Creek Unit consists of a verbal announcement to hunters 10 minutes before the lottery draw on the morning of the hunt, providing a list of refuge-specific regulations, safety procedures, sign in procedures, and a detailed map of the hunt area. The check station attendant remains on hand to answer any questions regarding the locations of assigned blinds. Hunters may also call a message detailing exact draw and shoot times for the next hunt day, bird averages for the previous hunt day and current hunt area habitat conditions.

Hunters may also attend the "Blind Brush-Up Day" at the Salmon Creek Unit, held prior to the hunt season. This allows hunters to tour the hunt area while preparing blinds for the upcoming waterfowl season. There is no orientation for hunting at the other refuge units, but hunters can contact staff at the Richard J. Guadagno Headquarters and Visitor Center with any questions they may have. A suggestion box is provided at the hunt check station in addition to periodic meetings to gather input from the public on the hunting program at Humboldt Bay NWR.

H. Hunter Requirements

Hunters are required to comply with all State, Federal and refuge-specific regulations. Refuge-specific regulations are available on the refuge website and copies are available at the Richard J. Guadagno Headquarters and Visitor Center and hunter check station on hunt days.

VIII. References

Pacific Coast Joint Venture (PCJV). 2004. Pacific Coast Joint Venture (PCJV), Northern California Component, Strategic Plan Update.

Humboldt Bay Management Plan, HBHRCD Draft Environmental Impact Report April, 2006.

Waterfowl Hunt Plan - Humboldt Bay NWR

Prepared by:

Visitor Services Asst. _____ Date_____
Humboldt Bay NWR

Project Leader _____ Date_____
Humboldt Bay NWR

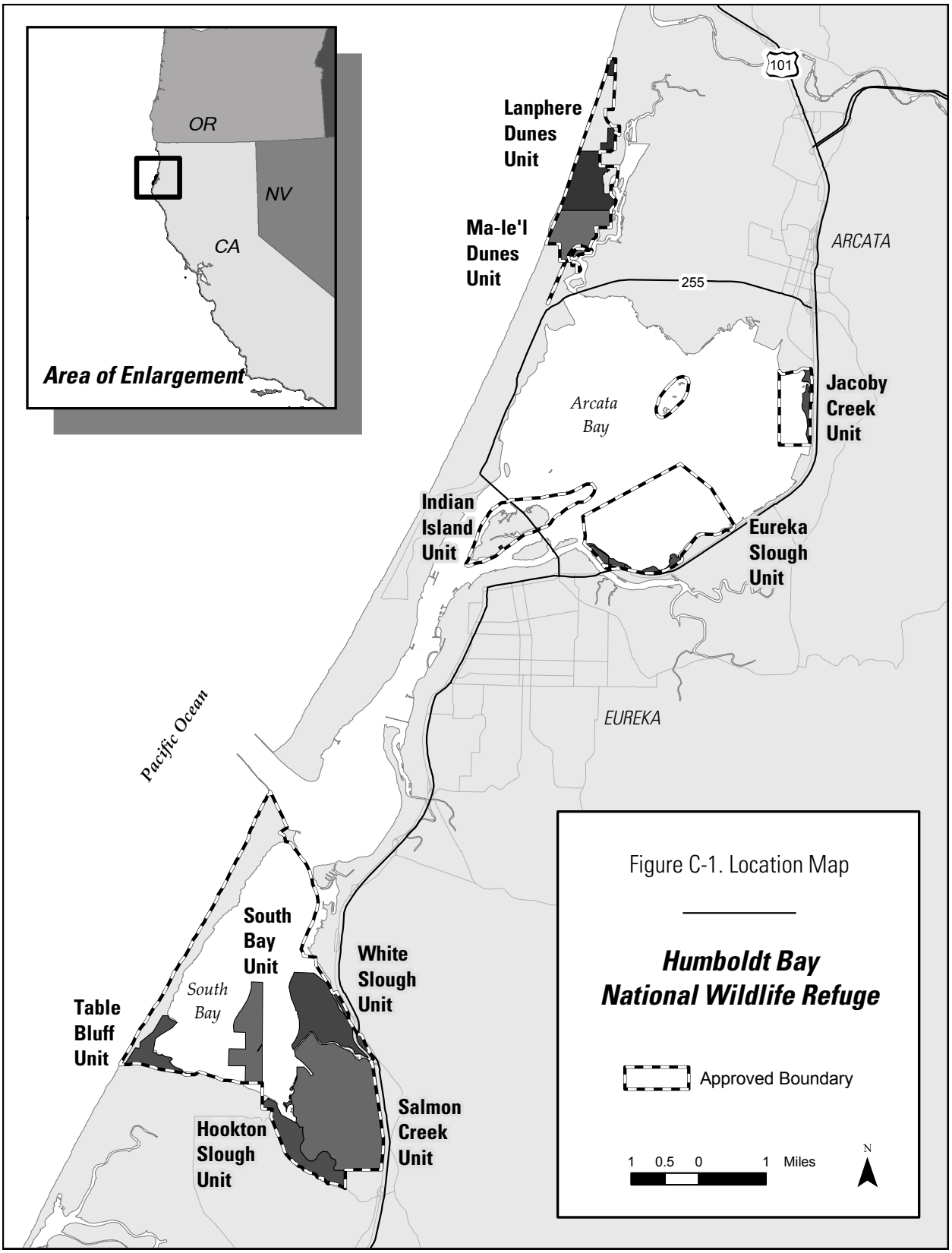

Figure C–1: General location and overview map of the Humboldt Bay NWR.

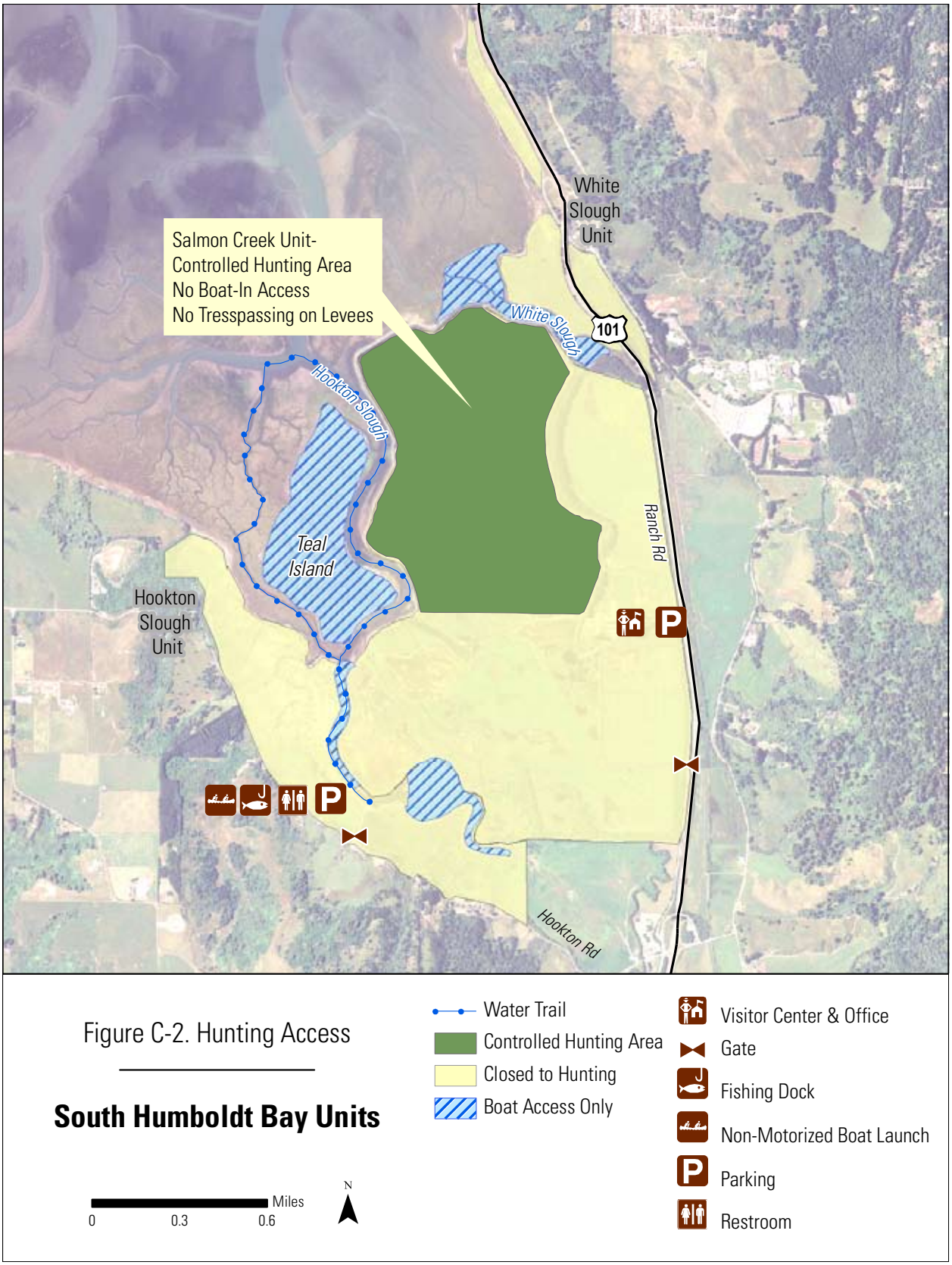

Figure C–2: Location and boundary map of hunting areas on the southern units of Humboldt Bay NWR.

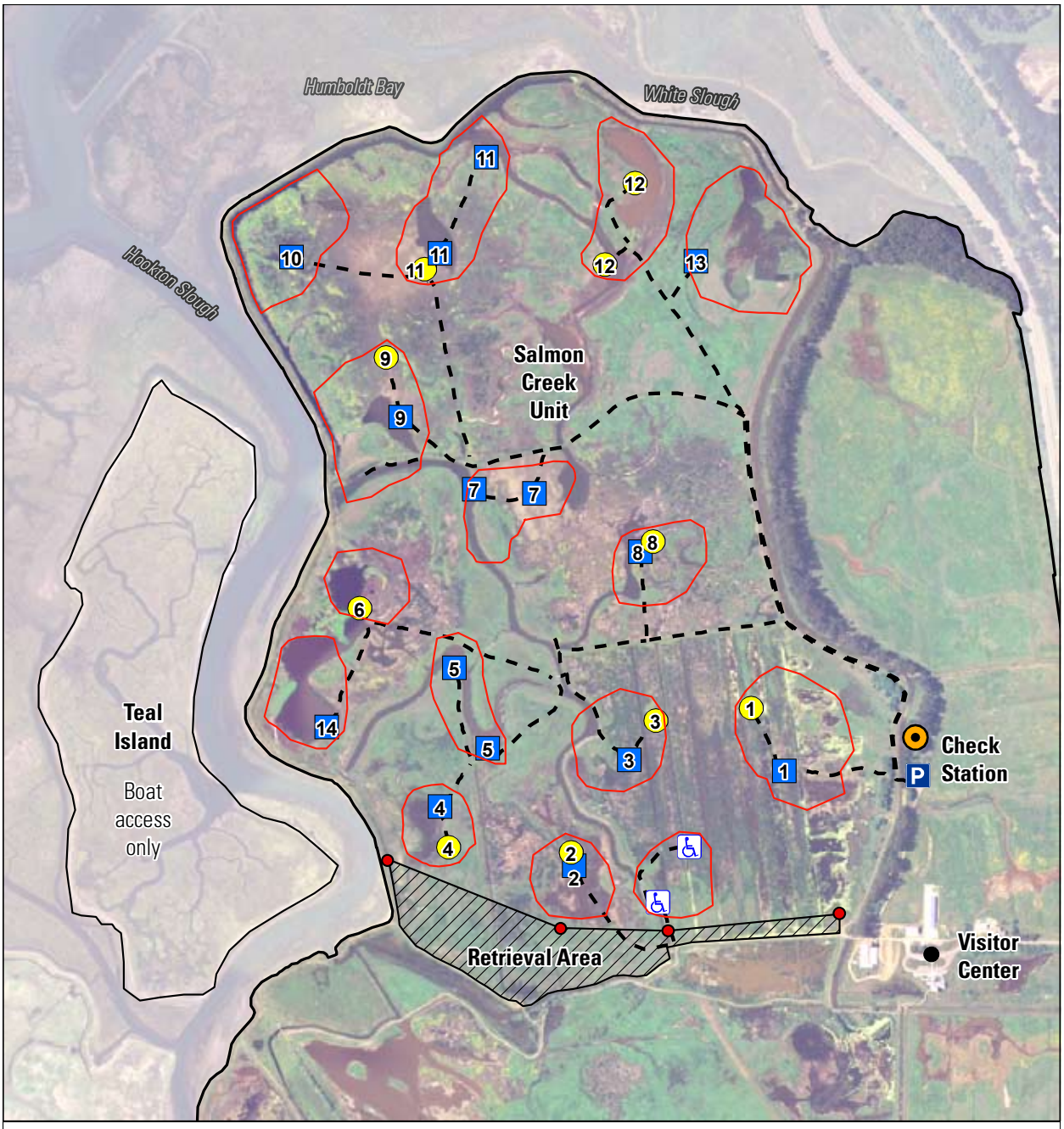

Figure C–3: Map of the hunting area at Salmon Creek Unit.

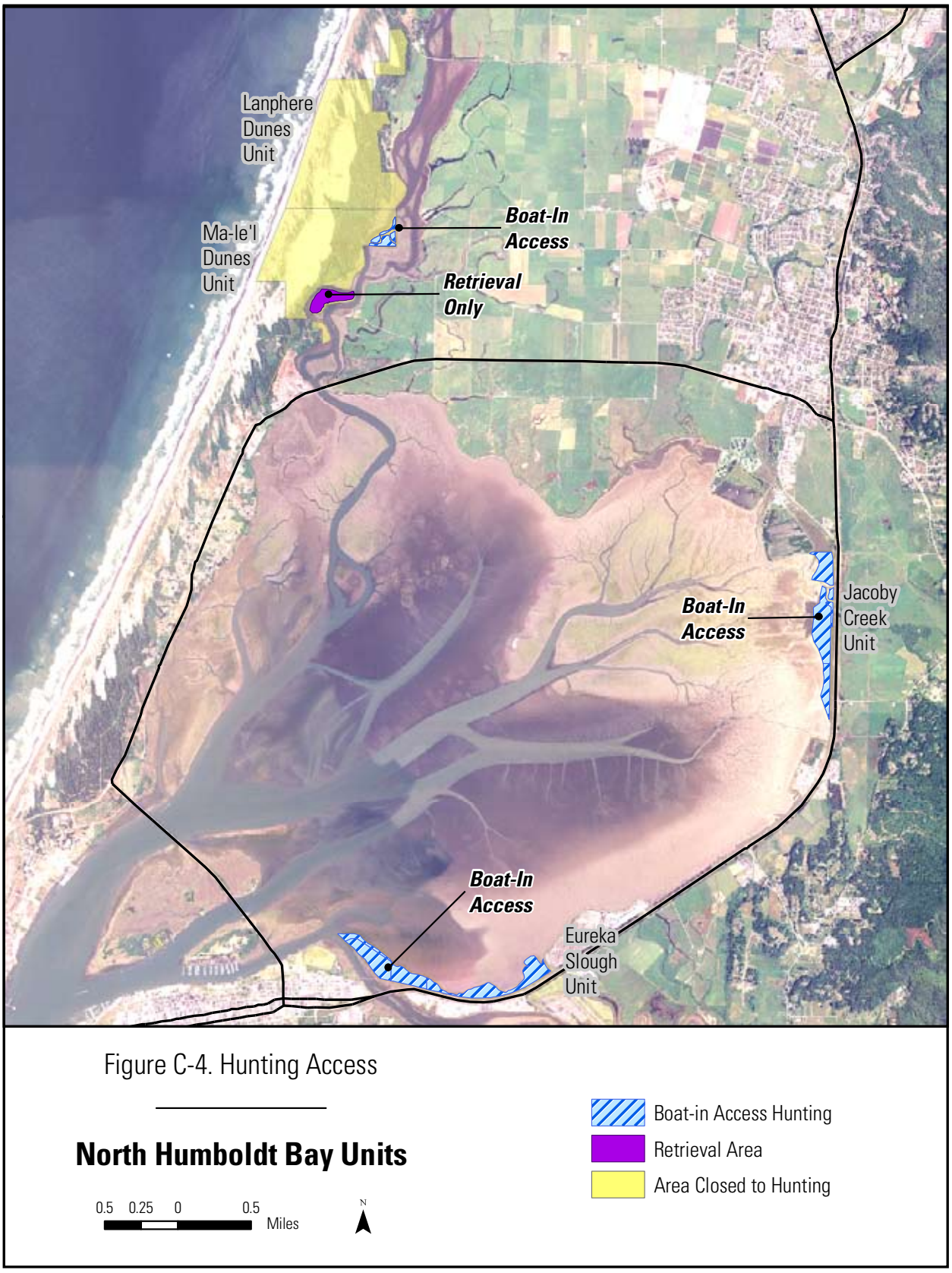

Figure C–4: Location and boundary map of hunting areas on the northern units of Humboldt Bay NWR.

Table C–1: Blind types at the Salmon Creek Unit hunt area

Salmon Creek Unit controlled hunting blind types 2007-08.

Blind Number	Stand-up Blinds	Pit Blinds
Disability	2	0
1	1	1
2	1	1
3	1	1
4	1	1
5	2	0
6	0	1
7	2	0
8	1	1
9	1	1
10	1	0
11	2	1
12	0	2
13	1	0
14	1	0

Note: One pit blind means two hunters can be in pits.
Note: No more than four hunters per blind at any time.

Appendix D: Draft Sport Fishing Plan

DRAFT SPORT FISHING PLAN

Humboldt Bay National Wildlife Refuge

November 2008

Fisherman at Hookton Slough Boat Dock Photo: USFWS

A. Physical Environment

Humboldt Bay is situated 280 miles north of San Francisco and 85 miles south of the Oregon border (Figure 1). Topography in the general region of Humboldt Bay is characterized by steep mountains and narrow valleys, which are typical of the coast ranges of northern California. Most of these uplands are covered by dense forests of redwood and Douglas-fir.

Humboldt Bay National Wildlife Refuge (HBNWR) is located in Humboldt County, California, with refuge units within and adjacent to Humboldt Bay and associated watersheds. The approved refuge boundary is roughly defined by Hookton Road on the south, Mad River County Park on the north, Highway 101 and Mad River Slough on the east, and the Pacific Ocean on the west (Figure 1). Humboldt Bay lies on a narrow coastal plain. It is one of the few naturally protected harbors found in California. Humboldt Bay measures from ½ to 4 miles wide and 14 miles long. Humboldt Bay is an open lagoon system protected from the ocean by two long sand spits except for a narrow entrance channel permanently kept open by dredging and rock jetties. Four creeks and several sloughs, draining approximately 288 square miles, flow directly into the bay. The total surface water areas of the bay are 26.5 square miles at high tide and 7.8 square miles at low tide. The tidal range at the bay entrance is about 6.4 feet. Two major rivers, the Mad and the Eel, bound the area on the north and south, respectively, and flow directly into the ocean. The countryside adjacent to the bay is relatively flat with rolling terraces.

Humboldt Bay consists of three primary sections: Arcata Bay in the north, Entrance Bay in the middle and South Bay. Below are brief descriptions of each section as described in the Humboldt Bay Management Plan (HBHRCD 2007):

Arcata (North) Bay

Arcata Bay is bounded by the Samoa Peninsula and the North Spit to the west; the Arcata Marsh and Wildlife Sanctuary, Arcata Bottoms, and City of Arcata to the north; Bayside Bottoms and Bracut areas to the east; and the City of Eureka and Woodley Island to the south. Arcata Bay covers approximately 13 square miles and is approximately 5.8 miles at its longest and 4.3 miles at its widest points. This portion of the bay is generally shallow, with over half of the area exposed at low tides. These tidal flats are incised by several deeper channels, as well numerous shallow channels. Most of the mud-silt bottom of Arcata Bay is exposed on average low tides, creating habitat for foraging shorebirds.

Entrance Bay

Entrance Bay is approximately five miles long and generally less than a mile wide. It is bounded by the North Spit on the west, Arcata Bay to the north, the City of Eureka and Elk River Spit and wetlands to the east. It includes Woodley Island, Indian Island and the City of Eureka waterfront. Entrance Bay, with a mostly sand bottom, lacks the expansive mudflats found in Arcata Bay and South Bay.

South Bay

South Bay covers approximately 7 square miles and is approximately four miles at its longest and 2.5 miles at its widest points. It is bounded by the South Spit on the west side, Entrance Bay on the north, lands and waters of the Humboldt Bay National Wildlife Refuge (HBNWR) Complex on the southeast, and Table Bluff to the southwest. Like Arcata Bay, much of the South Bay is occupied by broad expanses of tidal flats incised by numerous small, shallow channels and one deep-water channel which serves the Fields Landing and King Salmon areas and is maintained for navigation. South Bay supports eelgrass over much of its silt bottom, with the higher elevations of the east and south sides exposing bare mudflats on most low tides.

In 1971, the Humboldt Bay National Wildlife Refuge was established to conserve important habitat for the great diversity of animals and plants that occur in the Humboldt Bay area. Humboldt Bay NWR has several different units totaling almost 3,500 acres. These units consist of a mixture of mudflats, estuarine eelgrass meadows, salt marsh, brackish marsh, seasonally flooded freshwater wetlands, riparian wetlands, streams, coastal dunes, and forest. These habitats support over 316 species of birds and 40 species of mammals. The refuge also provides habitat for ~ 100 species of fish and marine invertebrates, many of which contribute to sport and commercial fisheries, including steelhead, Coho and Chinook salmon, and Dungeness crab.

Concentrations of migratory waterbirds, especially shorebirds, occur in the fall, winter, and spring. In winter, it is not unusual for over 100,000 birds to use Humboldt Bay as a feeding or resting site. Key habitats

for these waterbird concentrations are eelgrass beds and extensive mudflats. These also make the bay an important spawning, nursery, and feeding area for fish and other marine life. Complimentary to the bay habitats are thousands of acres of seasonal wetlands (mostly former tidal wetlands that have been diked off for over a century).

Endangered or threatened species include: brown pelican, snowy plover, Chinook and Coho salmon, steelhead, tidewater goby, Humboldt Bay wallflower, and beach layia. The Lanphere Dunes and Ma-le'l Dunes Units protect endangered and rare plants within rare dune plant communities. The refuge contains one of very few dune systems in which the underlying processes are intact.

The Humboldt Bay watershed is considered the most important wintering waterfowl habitat between San Francisco Bay and the Columbia River (PCJV 2004). Many species of waterfowl use habitats on Humboldt Bay NWR, particularly for resting and foraging during their annual migrations. Seasonally common waterfowl that use Humboldt Bay NWR and nearby wetlands and agricultural short-grass pastures during migration include: northern pintail, northern shoveler, American wigeon, green-winged teal, mallard, bufflehead, scaup, tundra swan, Pacific brant, Aleutian and cackling geese, and non-native Western Canada geese, which were introduced to the area in the 1980's. Larger, seasonally common waterfowl such as Pacific brant, Canada geese, and cackling geese are highly valued by sport hunters and by wildlife watchers alike. This refuge has also been described as one of the most important areas in the United States south of Alaska for Pacific brant. This is especially true during the spring when the bay is a key staging area for more than 60% of the flyway Pacific brant population prior to their return to arctic nesting grounds. Similarly, the northcoast of California and southern coast of Oregon are key spring staging areas for the growing population of Aleutian cackling geese.

II. Conformance with Statutory Authorities

Humboldt Bay National Wildlife Refuge was established by authority of the Migratory Bird Conservation Act of February 16, 1929, as amended, and the Migratory Bird Hunting and Conservation Stamp Act of March 16, 1934, as amended. The purpose of the refuge is to protect and enhance wetland habitats in and adjacent to Humboldt Bay for a wide variety of migratory waterbirds, especially Pacific brant. National Wildlife Refuges are guided by the mission and goals of the National Wildlife Refuge System (NWRS), the purposes of an individual refuge, Fish and Wildlife Service (FWS) policy, laws, and international treaties. Relevant guidance includes the National Wildlife Refuge System Improvement Act of 1997, Refuge Recreation Act of 1962, and selected portions of the Code of Federal Regulations and Fish and Wildlife Service Manual.

The National Wildlife Refuge System Improvement Act of 1997 provides guidelines and directives for the administration and management of all areas in the NWRS. The Act also defines six wildlife-dependent priority public uses, including sport fishing, which refuges should strive to provide when compatible with the purposes of the refuge and the mission of the NWRS. Prior to refuge acquisition, sport fishing access was by private boat only. Land access was not available to the general public. Therefore, a historical precedent for sport fishing on refuge lands exists as some of the lands and waters acquired by the refuge were utilized for sport fishing prior to refuge acquisition and public access to sport fishing opportunities will be increased through this plan. Sport fishing is permitted in accordance with State, Federal and refuge-specific regulations to ensure that it will not interfere with the conservation of fish and other wildlife and their habitats.

III. Statement of Objectives

The goal of the National Wildlife Refuge System is: To provide the general public with a quality wildlife-oriented recreational experience and an opportunity to utilize a renewable natural resource. The objectives of the Humboldt Bay NWR Sport fishing Plan are to:

1. Provide a quality wildlife-dependent recreational experience, using a renewable natural resource.

The goals of HBNWR as established by the Refuge Comprehensive Conservation Plan (CCP) are to:
1. Conserve, manage, restore, and enhance estuarine and palustrine wetland habitats representative of the Humboldt Bay area to benefit their associated native fish, wildlife, plants, and special status species.

2. Conserve and restore globally rare dune and dune forest habitats, associated native plant and animal species and support recovery of threatened, endangered, and endemic species dependent upon these rare habitats.
3. Promote long term viability of the Humboldt Bay estuarine and dune ecosystems through ecosystem based management coordinated with both public and private partners around the bay.
4. Provide public with safe, high-quality wildlife-dependent recreation and volunteer opportunities to enhance public appreciation and understanding of fish, wildlife, plants, and habitats of Humboldt Bay and associated watersheds.
5. In cooperation with tribal representatives identify and protect cultural resources on the Humboldt Bay NWR.

Therefore, the Sport Fishing Plan will contribute to refuge goal number four (see above) without impeding the ability of the refuge to achieve remaining refuge goals. This plan will allow sport fishing on designated refuge units under State regulations as well as regulations set by the Fish and Wildlife Service specifically for HBNWR.

IV. Assessment of Resource

Sport fishing in Humboldt Bay is a popular form of recreation. Well established fisheries for perch, smelt, salmon, rockfish, crabs and clams provide for local enthusiasts as well as tourists. A complete listing of all fish found in Humboldt Bay is located in Appendix K.

All of Humboldt Bay including that portion of Salmon Creek on the refuge provides habitat for Endangered Species Act (ESA) listed threatened steelhead, Coho, and Chinook salmon. Endangered tidewater gobies are also found in estuaries and up to 1km (0.6 mi) upstream. Coastal cutthroat trout are a State Species of Special Concern.

Declines in salmon stocks on the north coast have resulted in sharply reduced or closed seasons and shifts in fishing effort to other species. Fisheries gaining rapidly in popularity are Dungeness crab (*Cancer magister*), leopard shark (*Triakis semifasciata*), California halibut (*Paralichthys californicus*), and various species of clams. Sport fishing within Humboldt Bay accounts for more than 30,000 angler-days each year. Most of the sport fishing in South Humboldt Bay occurs on the South Jetty and at Buhne's Point.

Historically, the four major tributaries of Humboldt Bay were popular trout fishing streams. Elk River, Freshwater Creek, Salmon Creek, and Jacoby Creek held resident populations of cutthroat trout. Steelhead and salmon augmented the fishermen's catch. Current observations indicate occasional localized sport fishing on these streams. Cutthroat trout were planted in lower Freshwater Creek in 1992 to enhance the fishery. No sport fishing is allowed on Jacoby Creek or Salmon Creek within the refuge boundaries. Sport fishing on both creeks is limited to private properties upstream from the refuge. A fishery management plan was completed for Humboldt Bay NWR in September 1992.

V. Description of Sport Fishing Program

A. Areas Opened

Public sport fishing will continue to be permitted on navigable waters of Humboldt Bay that fall within the existing refuge boundary. Most sport fishing in Humboldt Bay will occur from boats on navigable waters. Sport fishing will also continue to be permitted from the Hookton Slough boat dock and off the Hookton Slough trail, west of the designated parking lot. This area is known as the "Hookton Slough Shoreline Fishing Trail" (Figure 2).

Sport fishing will be opened to the public at the end of the Cukish trail (end of railroad berm) at the Male'l Dunes Unit. Boaters can also access Mad River Slough from the boat ramp on Lanphere Road or from Samoa Blvd. All others areas within the refuge remain closed to sport fishing (Figure 3).

B. Procedures for Coordination with State

The California Department of Fish and Game (CDFG) will be consulted if any changes are planned in the refuge sport fishing program. For seasons, limits, and fishery-related species to be taken, sportfishers should refer to State of California Sportfishing Regulations.

Additionally, refuge staff meets with CDFG, Bureau of Land Management (BLM) and FWS managers and wardens before and after each hunting season to discuss the hunting season and possible improvements for the coming year. During this meeting, any issues arising from the sport fishing program will be discussed.

Kayakers using the Hookton Slough non-motorized boat launch to access Hookton Slough and South Bay. Photo: USFWS

C. Methods of Enforcement

Refuge staff patrols public sport fishing areas on the refuge as part of their normal duties. Law enforcement officers with CDFG, BLM, and FWS will continue to enforce all applicable laws within their authority.

D. Funding and Staffing Requirements

The costs of managing the sport fishing program are minimal, and consist primarily of posting and maintaining "Public Fishing Area" signs and including sport fishing information in the refuge brochure and website. Necessary funds are available for this work within the annual budget of Humboldt Bay NWR. Because of the relatively light opportunity and pressure from sport fishing there will be no facilities developed or managed specifically for the use of anglers.

VI. Measures Taken to Avoid Conflict with Other Objectives

A. Biological Conflicts

The non-tidally influenced areas (dikes and seasonal wetlands) will be closed to sport fishing to provide disturbance-free resting and foraging areas for migratory birds. Anglers will be monitored on an opportunistic basis to determine if any wildlife disturbance is occurring. The sport fishing program will not affect any threatened or endangered species.

B. Public Use Conflicts

Sport fishing at Humboldt Bay NWR is not expected to have any adverse effects on refuge resources or to conflict with any other visitor activities.

C. Administrative Conflicts

At this time no administrative conflicts are anticipated.

VII. Conduct of the Sport Fishing Program

A. Refuge-Specific Regulations

Sport fishing is permitted on designated areas of Humboldt Bay NWR subject to the following refuge-specific regulations:

1. A State Fishing License is required to fish on all refuge property.
2. Sport fishing from the Hookton Slough boat dock, the Hookton Slough Shoreline Fishing Trail along Hookton Slough and from the end of the Cukish trail at the Ma-le'l Dunes Unit is permitted during daylight hours only. No wading from shore is permitted at any units.
3. Only the use of pole and line or rod and reel is permitted from the Hookton Slough boat dock, the Hookton Slough Shoreline Fishing Trail and from the end of the Cukish trail at the Ma-le'l Dunes Unit.
4. Use or possession of alcohol is prohibited on refuge property.
5. Fish may not be cleaned on refuge property.
6. Littering is prohibited and will be prosecuted.

B. Anticipated Public Reaction to the Sport Fishing Program

Most sportfishers support the expansion and continued existence of sport fishing on the Humboldt Bay NWR. Sport fishing has strong traditional use in the Humboldt Bay area. During the comment period for the CCP in February 2007, a number of opinions were heard from the public regarding the increased opening of refuge lands to wildlife- dependent recreation opportunities. The majority of comments received supported increasing access to the refuge for wildlife-dependent recreation.

C. Media Used to Publicize Fishing Opportunities

The Sport Fishing Plan will be announced in the media as part of the refuge CCP process, and will be released as an amendment to the HBNWR CCP.

D. Fishing Requirements

Sportfishers must comply with all State, Federal, and refuge-specific regulations.

VII. Literature Cited

Ma-le'l Dunes Cooperative Management Area Access Plan. 2008.

Pacific Coast Joint Venture (PCJV). 2004. Pacific Coast Joint Venture (PCJV), Northern California Component, Strategic Plan Update.

Humboldt Bay Harbor Conservation and Recreation District Management Plan, 2007.

Humboldt Bay Management Plan, HBHRCD Draft Environmental Impact Report April, 2006.

Fishing Plan- Humboldt Bay NWR

Prepared by:

Visitor Services Asst. _____ Date_____
Humboldt Bay NWR

Project Leader _____ Date_____
Humboldt Bay NWR

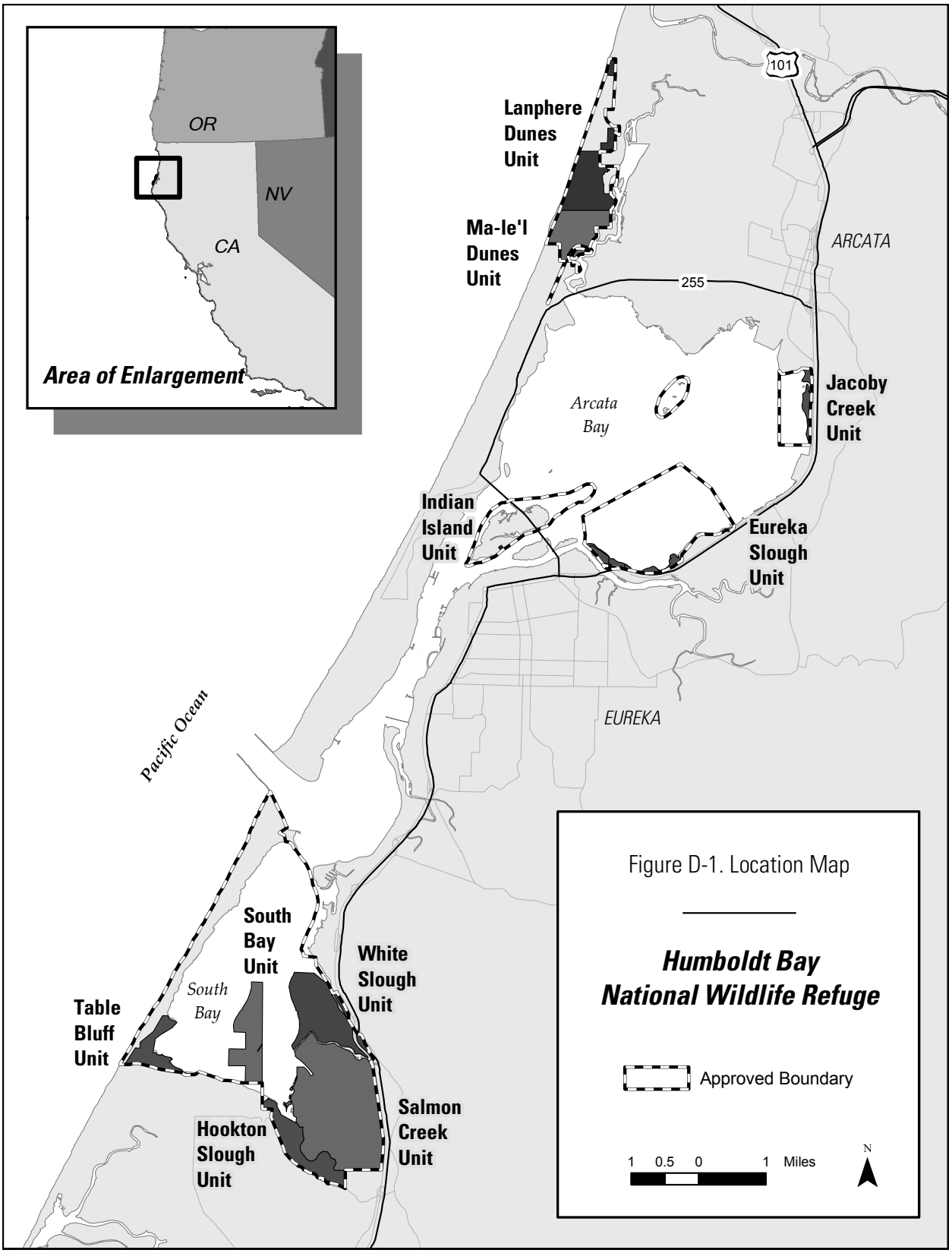

Figure D–1: General location and overview map of the Humboldt Bay NWR.

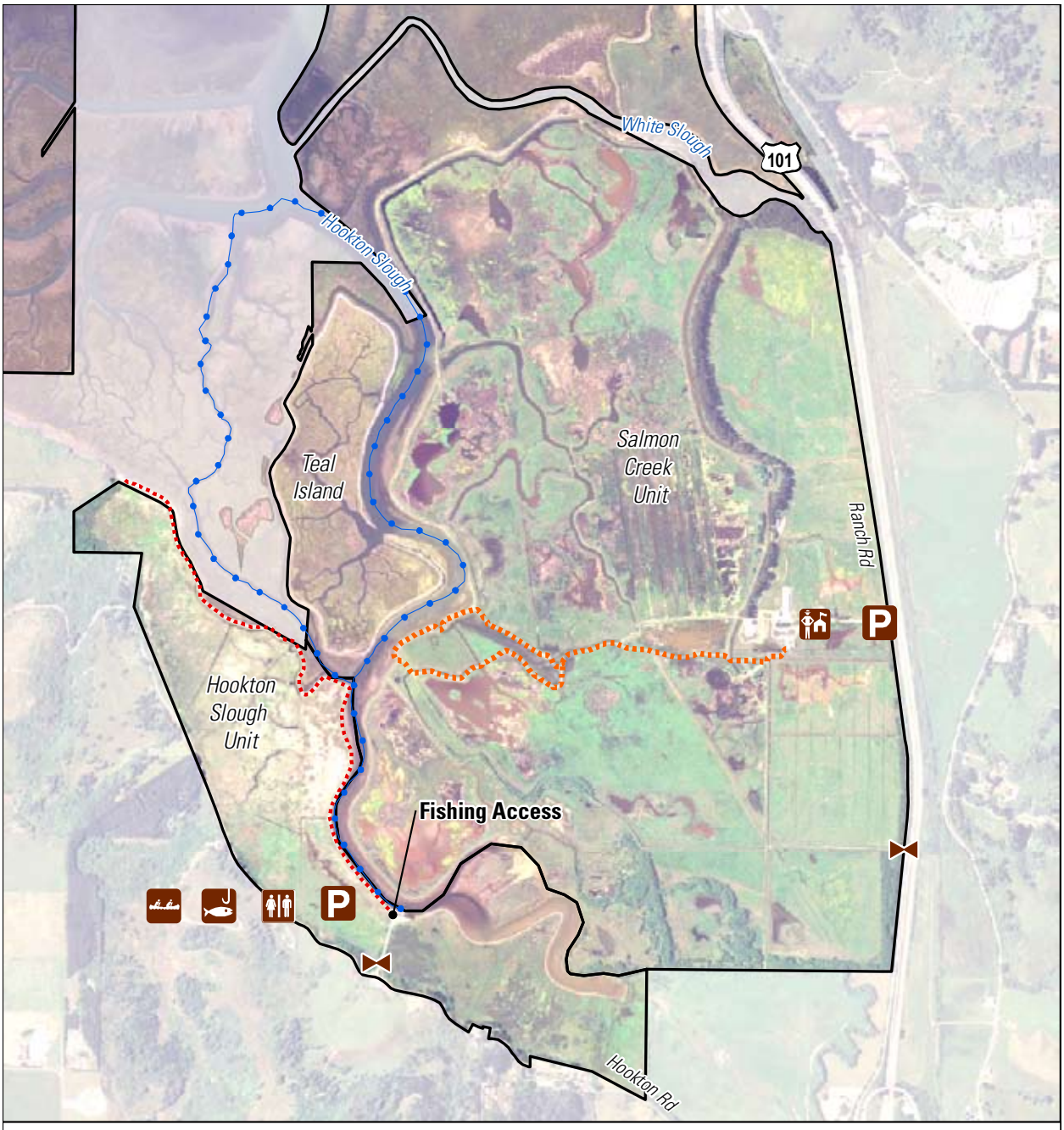

Figure D–2: Public fishing areas on the southern units of Humboldt Bay NWR.

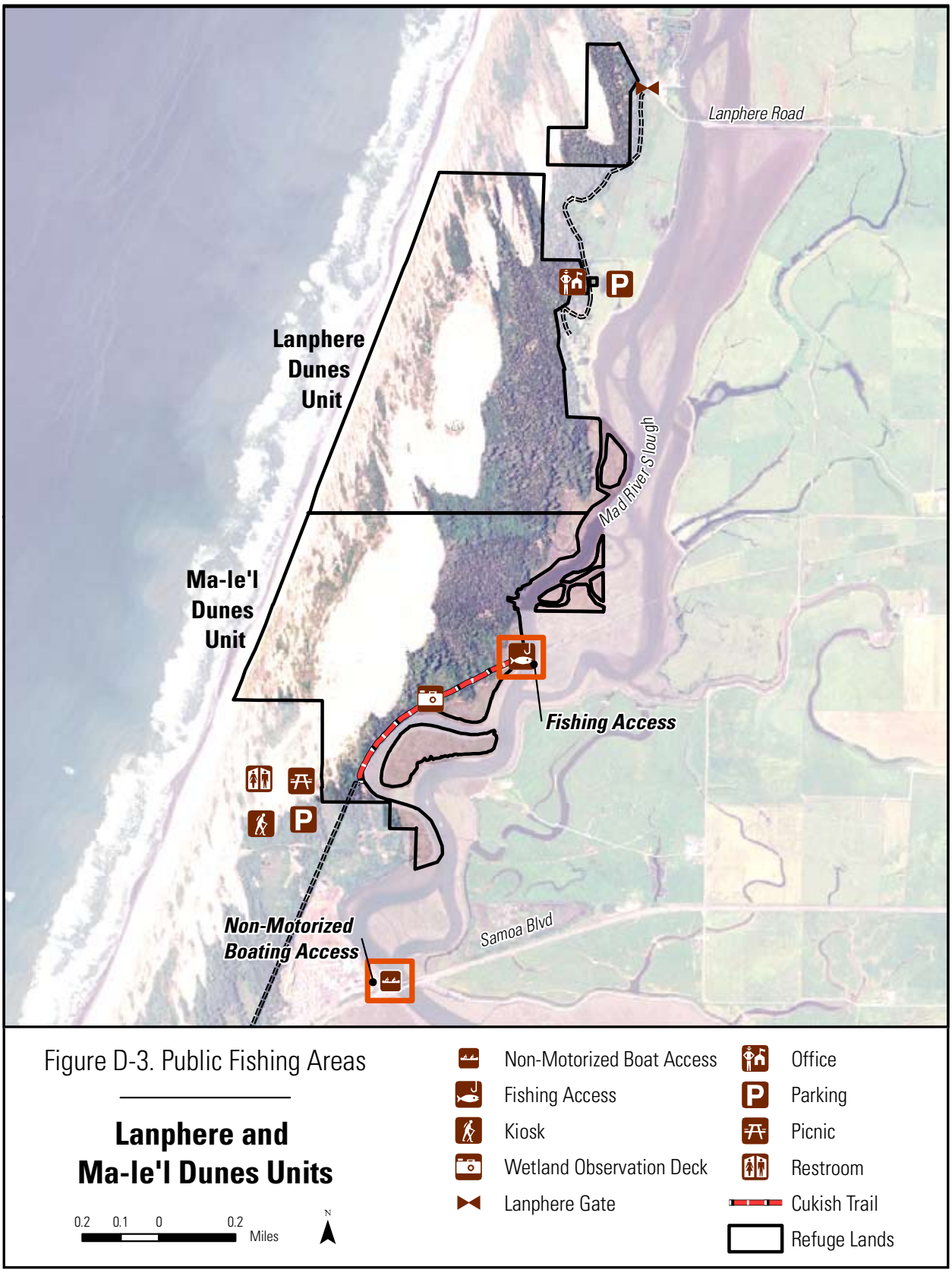

Figure D–3: Public fishing areas on the Ma'le'l Dunes Unit of Humboldt Bay NWR.

Appendix E: Draft Environmental Assessment for the Humboldt Bay NWR Complex Draft Comprehensive Conservation Plan

Draft Environmental Assessment for the Humboldt Bay NWR Complex Draft Comprehensive Conservation Plan

Prepared By:

U.S. Fish and Wildlife Service
California Nevada Region
Refuge Planning
2800 Cottage Way, W-1832
Sacramento, CA 95825-1846

and

U. S. Fish and Wildlife Service
Humboldt Bay National Wildlife Refuge Complex
1020 Ranch Rd.
Loleta, CA 95551-9633

January 2009

Table of Contents for Humboldt Bay NWR Complex Environmental Assessment

Appendix

Tables

Figures

Chapter 1. Purpose and Need for Action

Introduction

This environmental assessment (EA) evaluates the environmental effects of three alternatives for managing the Humboldt Bay National Wildlife Refuge Complex (Complex), which includes the Humboldt Bay National Wildlife Refuge (NWR) and Castle Rock NWR. The U.S. Fish and Wildlife Service (Service) will use this EA to solicit public involvement in the refuge planning process and to determine whether implementation of the Comprehensive Conservation Plan (CCP) will have a significant effect on the quality of the human environment. This EA is part of the Service's decision-making process in accordance with the National Environmental Policy Act (NEPA).

Proposed Action

The Service proposes to implement Alternative C as the Comprehensive Conservation Plan for Humboldt Bay and Castle Rock NWRs, as described in this EA. Alternative C is described in more detail in Chapter 5 (Complex Vision, Goals, and Objectives) of the CCP. The Service examined a range of management alternatives. Specific details regarding the preferred alternative and the other alternatives that were evaluated are provided in Chapter 2 of this EA. Of these, Alternative C represents the Service's proposed action. However, the final decision can be any of the alternatives, and may reflect a modification of certain elements of any alternative analyzed based on consideration of public comment. Of the alternatives evaluated, Alternative C appears to best achieve the purpose, vision, and goals for the refuges, while also appropriately addressing the major issues and relevant mandates identified for each refuge during the CCP process.

Purpose of and Need for the Proposed Action

There is a need for written guidance on refuge operations, wildlife and habitat management, and visitor services to help ensure consistency among management of the refuge, year-to-year operations, and the refuge's purposes. The Proposed Action, the CCP, provides guidance for conducting general refuge operations, wildlife and habitat management, habitat enhancement and restoration, and visitor services. The CCP is intended to ensure that management actions are consistent with the purposes for which the Refuges were established, the mandates of the Refuge System, and the Refuges' goals and objectives. The purpose of the Proposed Action is to describe the desired future conditions of Humboldt Bay and Castle Rock NWRs over the next 15 years and provide guidance for achieving those conditions.

The CCP:
- Sets a long term vision for the Refuges;
- Establishes management goals, objectives, and strategies for the Refuges;
- Provides the Refuges with a 15-year management plan for the conservation of fish, wildlife, and plant resources and their related habitats;
- Defines compatible public uses;
- Develops a plan that, when fully implemented, will achieve refuge purposes, help fulfill the mission of the system, and maintain and, where appropriate, restore ecological integrity;
- Communicates the Service's management priorities for the refuges to the public; and
- Provides a basis for budget needs to support staffing, operations, maintenance, and capital improvements.

The development of the CCP is also required to fulfill legislative obligations of the Service. The National Wildlife Refuge System Administration Act of 1966, as amended by the National Wildlife Refuge System Improvement Act of 1997 (Improvement Act), requires that every refuge or related complex of refuges have a CCP in place within 15 years of the Improvement Act's enactment. The NEPA requires that an EA or environmental impact statement (EIS) be prepared to accompany the CCP to evaluate the effects of different alternatives that meet the goals of the refuges and identifies the Service's proposed action for implementing the CCP.

Project Area

The Humboldt Bay National Wildlife Refuge Complex, which includes Humboldt Bay National Wildlife Refuge (Humboldt Bay NWR) and Castle Rock National Wildlife Refuge (Castle Rock NWR), is located on the northern coast of California.

Humboldt Bay NWR is located on Humboldt Bay, the largest bay between San Francisco Bay and Coos Bay, Oregon, near the cities of Eureka and Arcata. In 1971, the Refuge was established to conserve coastal habitats for a great diversity of animals and plants, especially migratory birds. In later years, the Refuge added the Lanphere and Ma-le'l Dunes Units, to help conserve the most pristine remaining dune ecosystem on the west coast of the United States.

The Humboldt Bay NWR boundary consists of 9,502 acres (3,379 acres owned in fee title) of: freshwater, brackish, and salt marsh; agricultural wetlands, intertidal mudflats; eelgrass beds, as well as some of the most pristine dune habitats in the western United States.

Castle Rock NWR is a 14-acre nearshore island located in Del Norte County, California, less than a mile northwest of Crescent City consisting primarily of rock, with sparse vegetation. Castle Rock NWR hosts one of the largest and most diverse assemblages of breeding seabirds on the Pacific coast, provides a critical roost for thousands of Aleutian cackling geese prior to their transoceanic migration, and provides resting sites for seals and sea lions.

See Figure E-1. Location Map for Humboldt Bay National Wildlife Refuge.

Decisions to be Made

Based on the analysis documented in this draft EA, the Regional Director must determine the type and extent of management and visitor access that will occur on the Refuge and whether the selected management alternative would have a significant effect on the quality of the human environment.

The planning team recommends Alternative C to the Regional Director. The accompanying draft CCP was developed for implementation based on this recommendation.

Issues and Challenges Identification

The Service identified issues, concerns and opportunities through early planning discussions and the public scoping process. The scoping process officially began on January 29, 2007, when the Service published a Notice of Intent to prepare a CCP in the Federal Register (Vol. 72, No. 18, p. 4020). The first planning update was distributed in January 2007 to interested stakeholders that had been identified through other prior planning processes, to further solicit public input. A full discussion of the planning process and issues raised can be found in Chapter 2 and Chapter 4 of the CCP, respectively.

The planning team helped to further define the issues and challenges. The core planning team includes Service employees from the Humboldt Bay National Wildlife Refuge Complex and the California and Nevada Region, Refuge Planning.

Public Involvement

The first planning update was sent to 220 interested stakeholders announcing the public scoping meetings, and asking for comments on issues to be addressed in the CCP. An issues workbook was also distributed to the mailing list and at public meetings to help focus public input on issues relevant to the CCP.

Three public scoping meetings were held on February 13, 15, and 17, 2007, in Del Norte and Humboldt counties to receive public input on the Complex's CCP and associated NEPA document. Each public scoping meeting consisted of a presentation by Service staff on the CCP/NEPA process, a presentation on the history of the Refuges, questions and answers, and documentation of public comments. The majority of each public meeting was spent documenting public comments.

The planning staff has incorporated public input received in response to these updates and workshops into the CCP and EA; a summary of major issues and challenges is included in Chapter 4 of the CCP and a summary of public scoping comments is included in Appendix M, Public Involvement Process for the Humboldt Bay NWR Complex CCP/EA. The original comments are available for review in planning administrative files at the California and Nevada Region, Refuge Planning office, in Sacramento, California.

U.S. Fish and Wildlife Service and the National Wildlife Refuge System

The mission of the Service is working with others, to conserve, protect and enhance fish, wildlife, and plants and their habitats for the continuing benefit of the American people. The Service is the primary Federal agency responsible for managing migratory birds, endangered plants and animals, certain marine mammals, and inter-jurisdictional fish. The responsibility to conserve our nation's fish and wildlife resources is shared with other Federal agencies, State and Tribal governments.

As part of this responsibility, the Service manages the National Wildlife Refuge System (Refuge System). The Refuge System is the largest system of lands in the world dedicated to the conservation of fish and wildlife. Operated and managed by the Service, it currently includes over 500 refuges with a combined area of more than 94 million acres. The mission of the Refuge System is to administer a national network of lands and waters for the consideration, 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.

The Refuges are managed as part of the Refuge System in accordance with the National Wildlife Refuge System Administration Act of 1966 as amended by the National Wildlife Refuge System Improvement Act of 1997, and other relevant legislation, Executive Orders, regulations, and policies. Chapter 1 of the CCP summarizes many relevant Acts, regulations, and policies and describes the goals of the Refuge System.

Humboldt Bay NWR Purposes

Humboldt Bay NWR was established under the authority of the Migratory Bird Conservation Act of 1929, the Migratory Bird Hunting and Conservation Stamp Act of 1934, the Fish and Wildlife Act of 1956, the Refuge Recreation Act of 1962, and the Endangered Species Act of 1973.

According to these authorities, Humboldt Bay NWR's purposes are:

"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. §§ 715d (Migratory Bird Conservation Act)

"... for the development, advancement, management, conservation, and protection of fish and wildlife resources ..." 16 U.S.C. §§ 742f(a)(4) and "... 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) (Fish and Wildlife Act of 1956)

"...suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species..."16 U.S.C. §§ 460k-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 (Refuge Recreation Act [16 U.S.C. §§ 460k-460k-4], as amended)

"... to conserve (A) fish or wildlife which are listed as endangered species or threatened species .... or (B) plants ..." 16 U.S.C. §§ 1534 (Endangered Species Act of 1973)

Humboldt Bay NWR Goals

Goal 1. Conserve, manage, restore, and enhance estuarine and palustrine wetland habitats representative of the Humboldt Bay area to benefit their associated native fish, wildlife, plants, and special status species.

Goal 2. Conserve and restore globally rare dune and dune forest habitats, associated native plant and animal species and support recovery of threatened, endangered, and endemic species dependent upon these rare habitats.

Goal 3. Conserve and restore all refuge habitats through the prevention and control of invasive plants and animals.

Goal 4. Promote long-term viability of the Humboldt Bay estuarine and dune ecosystems through ecosystem-based management (including endangered and threatened species management across boundaries) coordinated with both public and private partners around the Bay.

Goal 5. Provide the public (and especially children) with accessible, safe, high-quality wildlife-dependent recreation opportunities to enhance public appreciation and understanding of fish, wildlife, plants, and habitats of Humboldt Bay and associated watersheds.

Goal 6. In cooperation with tribal representatives, identify and protect tribal cultural resources on the Humboldt Bay NWR. In addition, assess and manage the Refuge's more recent cultural resources and structures.

Castle Rock NWR Purposes

Castle Rock National Wildlife Refuge was established under the authority of the Endangered Species Act of 1973.

According to this authority, Castle Rock NWR's purpose is:

"... to conserve (A) fish or wildlife which are listed as endangered species or threatened species .... or (B) plants ..." 16 U.S.C. §§ 1534 (Endangered Species Act of 1973)

Castle Rock NWR Goals

Goal 1. Protect and maintain habitats for migratory birds and marine mammals, with an emphasis on seabirds, and Aleutian cackling geese.

Goal 2. Provide high quality environmental education, interpretive information, and outreach to the public highlighting the ecology and sensitivity of the wildlife of Castle Rock National Wildlife Refuge.

Chapter 2. Alternatives, Including the Proposed Action

Introduction

This chapter describes three alternatives for managing the Humboldt Bay National Wildlife Refuge Complex (Complex), which includes the Humboldt Bay National Wildlife Refuge (NWR) and Castle Rock NWR: Alternative A (No Action), Alternative B, and Alternative C (Preferred Alternative). These alternatives are described below. Figures E-2 through E-8 show a graphical representation of the alternatives described below. Two of the three alternatives presented in this chapter are "action alternatives" that would involve a change in the current management of the Complex. Under Alternative A, the No Action alternative, the Service would continue managing the Complex as it currently does. The Service's preferred alternative is Alternative C.

HUMBOLDT BAY NATIONAL WILDLIFE REFUGE

Current Management of Humboldt Bay NWR

For a complete description of the current management practices, please see Current Management of Humboldt Bay NWR and Current Management of Castle Rock NWR sections in Chapter 1 of the CCP.

Features Common to All Alternatives for Humboldt Bay NWR

Agricultural Grassland Maintenance

The Humboldt Bay NWR would continue to allow grazing and haying, through cooperative land management agreements with local ranchers, to maintain short-grass pasture habitat for migratory birds. Pasture soil pH would continue to be monitored every 3 to 5 years, and lime would be added as needed. In addition, Refuge staff would continue to conduct seasonally appropriate mowing (outside of nesting season) in areas where grasslands merge into wetland plant communities. Mowing would continue to be used throughout the Salmon Creek Unit, along wetland edges where haying is not feasible, to maintain grasslands and to control non-native thistle (*Cirsium* spp.) and other weeds.

Invasive Plant Management

Invasive plants are having an ever increasing negative effect on Refuge habitats (and adjacent private lands), and must be managed if future greater habitat losses are to be avoided. Although an Integrated Pest Management (IPM) plan has not yet been developed for the Humboldt Bay NWR, the Refuge staff will continue to manage non-native invasive plant species by using IPM strategies (including a combination of mechanical, chemical, biological, and cultural means of managing invasives). If herbicides are used to control invasive species on the Refuge, a Pesticide Use Proposal will be filed for each herbicide prior to use.

Throughout the Refuge, staff will control non-native dense-flowered cordgrass (*Spartina densiflora)* in salt marsh and freshwater and brackish marsh through a combination of manual and mechanical methods. In addition, staff will work with Federal, State and local partners to eradicate *Spartina densiflora* in the greater Humboldt Bay area, which is a high priority project of the West Coast Governors Agreement. Refuge staff would continue to control and eradicate invasive plants in freshwater and brackish marsh on all Humboldt Bay NWR units. Upland invasive plants common to all units that need to be controlled include thistles, bristly oxtongue (*Picris echioides*), English ivy (*Hedera helix*), Himalayan blackberry (*Rubus discolor*) and false bindweed (*Calystegia sylvatica*). On the Hookton Slough Unit emphasis would be placed on controlling newly established populations of marsh lotus (*Lotus uliginosus*), water iris (*Iris pseudacorus*), woodland ragwort (*Senecio sylvaticus*), reed canarygrass (*Phalaris arundinacea*), and Australasian fireweed (*Erechtites glomerata*). On the Table Bluff Unit, Refuge staff would eradicate or control invasive plants, particularly bullthistle (*Cirsium vulgare*) and Australasian fireweed (*Erechtites glomerata*). Refuge staff would also eradicate or control invasive species identified as early detection species in the Volunteer Invasive Species Mapping Program; reed canarygrass, Harding grass (*Phalaris aquatica*), barnyard grass (*Echinochloa crus-galli*), Andean pampas grass (*Cortaderia jubata*), and shortstalk false bindweed (*Calystegia sylvatica*). Refuge staff would use a combination of mechanical and chemical methods to remove non-native trees (including *Eucalyptus globulus*), such as cutting a tree at the base and then using a stump grinder or painting the stump with a Service-approved herbicide to prevent re-sprouting.

Refuge staff will implement large-scale experiments to determine the best methods of controlling or eradicating dune swale invasive plant species including rabbitsfoot grass (*Polypogon monspeliensis*), pennyroyal (*Mentha pulegium*), bird's-foot trefoil (*Lotus corniculatus*), and hyssop loosestrife (*Lythrum hyssopifolium*). These large-scale (0.5- to 1-acre) control experiments would involve the use of methods such as flaming, controlled burning, and mowing.

Refuge staff will continue to monitor and control invasive species such as English ivy, Francheti cotoneaster (*Cotoneaster franchetii*), and English holly (*Ilex aquifolium*) in coniferous dune forest, using a variety of manual and chemical methods, in coordination with partners such as the California Conservation Corp, the California Department of Forestry, and others. In some cases the staff may use the herbicide glyphosate to remove native poison oak (*Toxicodendron diversilobum*) plants, to be able to safely access and control non-native invasive plant species.

Herbicides that may be used, by Refuge staff, to control invasive plants on the Humboldt Bay NWR include: Rodeo (glyphosate), Roundup pro (glyphosate), Roundup pro concentrate (glyphosate), Milestone (aminopyralid), Garlon 3A (triclopyr TEA salt, triethylamine, ethanol), and Crossbow (2,4,d , triclopyr). Prior to any herbicides being used to control invasive species on Humboldt Bay NWR, a Pesticide Use Proposal will be filed for each herbicide and associated surfactants. Pesticides will only be used in compliance with labeling instructions. In addition, Refuge staff will also coordinate with Friends of the Dunes, which leads a monthly work day on the Ma-le'l Dunes Unit, and other volunteer groups.

Planting Native Plant Species
The Refuge will enhance riparian swamp habitat by planting appropriate native, understory plant communities. Newly planted vegetation in riparian habitat would be protected from deer browsing with individual wire cages or similar exclusion devices. The Refuge will increase populations of native dunegrass (*Leymus mollis*) on foredune communities, and will seek to develop a cooperative agreement with adjacent private land owners to collect native dune grass propagules.

Re-Introducing Endangered Plant Species
The Refuge will develop partnerships to collect Humboldt Bay wallflower (*Erysimum menziesii* ssp. *eurekense*) seeds from the south spit and staff will use the south spit seeds to re-introduce Humboldt Bay wallflowers to the Table Bluff Unit where the wallflower is no longer present. In addition, the Refuge will move seeds from occupied to unoccupied areas of wallflower habitat on the Lanphere and Ma-le'l Dunes Units. All work with endangered plants will be pursuant to required permits and results will be monitored.

Levee Maintenance and Water Management
The Refuge will continue to provide basic maintenance to all levees and raise low points of levees on the White Slough Unit to facilitate future salt marsh restoration. In addition, the Refuge will conduct maintenance repairs on the 2 existing White Slough tidegates. The Refuge will continue with standard wetland management and maintain hydrologic connection where necessary to minimize the potential for fish stranding and mosquito production on all diked units.

Implementation of the Salmon Creek Delta Restoration
The Refuge will continue to adaptively manage the implementation of Phase I of the Salmon Creek Restoration plan. NEPA compliance for Phase I of the Salmon Creek Restoration was previously completed (USFWS 1992). The Refuge will continue the process of returning 1,500 linear feet of Salmon Creek and approximately 100 acres of lower Salmon Creek to tidal influence. Adaptive management of this restoration project will be coordinated with the Arcata Fish and Wildlife Ecological Services program and NOAA's National Marine Fisheries Service. Adaptive management may include augmentation of tide gate function to maximize anadromous fish passage. Adaptive management would be informed by monitoring species' use of habitats, any changes in channel cross-sections, changes in sediment transport, and changes in water quality.

Monitoring
The Refuge will continue with partners to monitor the use of Salmon Creek and Hookton Slough by salmonids, tidewater gobies, and amphibians. The Refuge will establish a permanent tidal elevation station near the mouth of Salmon Creek on Hookton Slough to quantify tidal change over time in relation to tide

gate function. The Refuge and their partners would also seek to monitor for any potential impacts of Salmon Creek restoration on eelgrass beds in the South Bay.

The Refuge staff will continue regular monitoring of rare and endangered plants and plant communities including beach layia (*Layia carnosa*), Humboldt Bay owl's clover (*Castilleja ambigua* ssp. *Humboldtiensis*), Point Reyes' birds beak (*Cordylanthus maritimus* ssp. *palustris*), and pink sand verbena (*Abronia umbellata* ssp. *breviflora*). The refuge will also monitor for snowy plovers where appropriate.

Visitor Services – Environmental Education and Interpretation
The Refuge will maintain wheelchair accessibility of the Richard J. Guadagno Visitor Center and associated boardwalk out to the kiosk. The Refuge would continue to coordinate with Friends of the Humboldt Bay NWR volunteers and Audubon volunteers who offer guided bird walks on the Refuge units; Friends of the Dunes staff who would continue to offer guided natural history walks on the Lanphere Dunes Unit and the Ma-le'l Dunes Unit (once per month each) and who lead a restoration work day once per month on the Ma-le'l Dunes Unit; and host class tours on the dunes units. The Refuge would complete the South Bay Historic Hunt Cabin as an interpretive exhibit on the Salmon Creek Unit. The Refuge would also offer some special annual guided walks, environmental education and interpretation for events such as the Aleutian Goose Flyoff and National Wildlife Refuge week.

All existing interpretive exhibits and panels on Refuge units would be maintained. Refuge staff would continue to offer occasional presentations to community groups (four to six per year) at the Visitors Center and to allow up to 12 community groups to use the Visitors Center for meetings annually. The Refuge will continue to seek funding for a full-time Visitor Services Assistant. If it is possible to hire a new volunteer coordinator, that person would develop volunteer services and training with a target of managing a 100-person volunteer corps.

Visitor Services - Hunting
Refuge staff will begin a program of regular, daily bag checks to verify the number and species of waterfowl harvested by hunters. Law enforcement will also be increased on the Refuge, particularly during the waterfowl season, by contract or through support from other Service law enforcement staff. Hunting pit blinds at the Salmon Creek Unit will be modified to prevent stranding of wildlife. The Refuge will install improved directional signs in the hunt area of the Salmon Creek Unit, and post additional boundary signs on the Eureka Slough Unit, Jacoby Creek Unit, Table Bluff Unit, Egret Island, Teal Island, and Hookton Slough.

Cultural Resource Management
The Service will identify, inventory, evaluate, and nominate to the National Register sites eligible for the National Register under Criteria A-D in consultation with the aforementioned tribal Governments. The Refuge will work with the California and Nevada Regional Archeologist to ensure compliance with National Historic Preservation Act and to assess the long-term viability and cost of (restoring, maintaining, removing, or demolishing) several old Refuge structures including the barn and bunkhouse at Salmon Creek and the quarters at Lanphere Dunes. Additional environmental compliance documentation would be completed as required by NEPA.

Table E-1. Summary of Alternatives: Humboldt Bay National Wildlife Refuge

NOTE: Acreages and linear footage distances indicated in the alternative descriptions are approximate. Acronyms used in the Summary of Alternatives are listed as a footnote at the bottom of the table. All actions are scheduled for completion within the life of the CCP (15 years) unless otherwise noted.

Issue Area	Alternative A (*No Action Alternative*)	Alternative B	Alternative C (*Preferred Alternative*)
Goal 1. Conserve, manage, restore, and enhance estuarine and palustrine wetland habitats representative of the Humboldt Bay area to benefit their associated native fish, wildlife, plants, and special status species.			
Salmon Creek Delta Restoration	Adaptively manage 60 acres of Salmon Creek overflow and 50 acres adjacent to the main channel	Same as Alternative A	Same as Alternative B
	Monitor species, sediment transport in Salmon Creek	Within 3 years excavate 1,500 linear feet of Salmon Creek into a natural channel	Within 5 years excavate 500 linear feet to connect the new channel to salmon rearing habitat in Cattail Creek
	N/A	Implement Phase II of the Salmon Creek Restoration Project excavating historic channel	Same as Alternative B
	N/A	Construct off-channel estuarine wetlands and side-channels for salmonid rearing habitat	Same as Alternative B
	N/A	Replant riparian vegetation on sides of new channel to a minimum width of 100 feet	Same as Alternative B
	N/A	Install a fish screen in the new channel	Same as Alternative B and secure large woody debris within Hookton Slough
	N/A	Use excavated material for salt marsh restoration or dike maintenance	Same as Alternative B
Salt Marsh Habitat	Manage 313 acres of existing salt marsh	Same as Alternative A and restore a total of 125 acres to native salt marsh	Same as Alternative B and restore a total of 235 acres to native salt marsh
	N/A	On WSU, restore 35 acres to native salt marsh (included in 125-acre total)	On WSU, restore an additional 45 acres to native salt marsh (included in 235-acre total)
	N/A	On HSU, restore 90 acres on HSU to native salt marsh (included in 125-acre total)	On HSU, restore an additional 90 acres to native salt marsh (included in 235-acre total)
	On WSU, repair dike to allow for restoration and remove remaining dike on west side of TBU	Same as Alternative A	On TBU, restore 100 acres of overflow to native salt marsh (included in 235-acre total)

Issue Area	Alternative A (*No Action Alternative*)	Alternative B	Alternative C (*Preferred Alternative*)
	N/A	If feasible, raise tidal elevation of 60 acres of existing mudflat on Salmon Creek Overflow with clean fill and plant with native or propagated salt marsh vegetation	Same as Alternative B, and raise an additional 40 acres on lower Salmon Creek (total of 100 acres)
Freshwater and Brackish Marsh Habitat (FBM	On HSU, maintain 150 acres; on TBU maintain 25 acres; and on SCU maintain and enhance 630 acres of seasonal FBM	Same as Alternative A and on HSU and SCU enhance 100 of the 680 acres of FBM within 7 years	N/A
	N/A	On TBU, restore 13 acres of pasture vegetation to FBM within 7 years	Same as Alternative B
	On WSU, repair perimeter dike within 2 years	Same as Alternative A	Same as Alternative A
	On WSU, north and west areas, maintain 50 acres of FBM	On WSU, restore 4 acres of FBM	On WSU, maintain 7acres of FBM
	N/A	On WSU east area, enhance 14 acres of FBM	N/A
	On SCU, maintain and enhance 270 acres of short-grass pasture	On SCU and HSU, maintain and enhance 270 acres of grassland and restore 130 acres of wetland areas to short-grass pasture to improve ACG habitat	On SCU and HSU, maintain and enhance 270 acres of grassland and enhance 100 acres of wetland areas to short-grass pasture to improve ACG habitat
	On HSU, maintain hydrologic flushing to minimize mosquito breeding habitat	Same as Alternative A	Same as Alternative A
	Continue to use a CLMA to manage grasslands through a combination of grazing, mowing, and haying	Same as Alternative A	Same as Alternative A
	Continue soil testing in short-grass pasture and add lime when necessary to raise soil pH	Same as Alternative A	Same as Alternative A
	Continue seasonally appropriate mowing to maintain short-grass habitat and control thistle	On SCU, use seasonally appropriate mowing to promote short-grass species favorable to ACG	Same as Alternative B
	Promote plant communities that support ACG by seeding if needed	Same as Alternative A	Same as Alternative A

Issue Area	Alternative A (*No Action Alternative*)	Alternative B	Alternative C (*Preferred Alternative*)
	N/A	On SCU, enhance inundation through construction of low contour interior levees to create independent water management areas near duck ponds and in floodgate pasture	Same as Alternative B and install a low contour levee on SCU to impound water to enhance FBM
	N/A	On HSU, in far eastern and western areas manage for FBM while managing central portion as short-grass pasture and FBM	Same as Alternative B except on HSU implement a restoration plan that allows muted tidal exchange to east and west areas while allowing for fish passage, salmonid rearing and tidewater goby habitat; and partial tidal restoration in central area
	N/A	Work with Caltrans to re-route Chism Creek so that it enters west WSU area rather than directly into the Bay	Same as Alternative B
	N/A	On HSU, middle portion use mowing and/or grazing to promote short-grass species favorable to ACG	N/A
	N/A	N/A	On SCU, enhance drainage in short-grass areas to create more favorable conditions for grass and ACG
	N/A	N/A	On SCU, remove interior dikes around Headquarters unit and adjacent to Long Pond to enhance wetland values
Riparian Swamp Habitat	On SCU, maintain 35 acres of existing riparian swamp habitat and on the east side of WSU, re-vegetate an additional 6 acres	Same as Alternative A and:	Same as Alternative B
	N/A	Within 5 years replace 20 acres of non-native trees with native riparian swamp vegetation	Same as Alternative B
	Enhance riparian swamp habitat by planting native under story plants and providing protection against deer browse	Same as Alternative A	Same as Alternative A

Issue Area	Alternative A (*No Action Alternative*)	Alternative B	Alternative C (*Preferred Alternative*)
	N/A	If feasible, implement cooperative agreements to remove non-native trees and assist with native plantings	Same as Alternative B
Eelgrass and Mudflat Habitat	Participate in ongoing partnerships to conserve and manage eelgrass and mudflat habitat for long-term health	Same as Alternative A and create new partnerships to conserve and manage mudflat/eelgrass habitat for long-term health	Same as Alternative B
	Monitor eelgrass beds for potential effects of Salmon Creek restoration	Same as Alternative A	Same as Alternative A
	Continue partnership with the HBEBM program for eelgrass and mudflat habitat	Pursue additional funding for research and conservation through Service's coastal program to contribute to HBEBM program	Same as Alternative B
	N/A	Pursue an MOU with HBHRCD and CDFG to conserve inter-tidal areas within the refuge boundary	Same as Alternative B
Floodplain Management	Manage Humboldt Bay NWR floodplain consistent with local, State and Federal guidelines	Same as Alternative A and:	Same as Alternative B
	Continue to maintain all existing levees and conduct repairs to maintain function	Within 10 years, work toward achieving the relevant water quality objectives in Section 3 of the North Coast Basin Plan for the benefit of fish and wildlife resources	Same as Alternative B
	Implement habitat improvement strategies so that they do not worsen local or regional flooding, water quality, or erosion	Same as Alternative A	Same as Alternative A
	N/A	Develop a long-term water quality monitoring program for nonpoint sources of pollution entering the Humboldt Bay NWR	N/A
	N/A	With partners, develop a long-term water quality monitoring program to document effects of sediment flushing from Salmon Creek on eelgrass beds in southern Humboldt Bay	Same as Alternative B

Issue Area	Alternative A (*No Action Alternative*)	Alternative B	Alternative C (*Preferred Alternative*)
Goal 2. Conserve and restore globally rare dune and dune forest habitats, associated native plant and animal species and support recovery of threatened, endangered, and endemic species dependent upon these rare habitats.			
Dune Mat/Foredune Grassland	On LDU, maintain 125 acres of dune mat/foredune grassland	Same as Alternative A and:	Same as Alternative B and:
	N/A	On all suitable parts of the LDU, MDU, and TBU restore native dune mat/foredune grassland communities	Same as Alternative B
	N/A	N/A	On LDU, create ongoing experimental dune blow-outs to assess effects on plants
	On MDU, TBU, and part of LDU, re-introduce HB wallflower	Same as Alternative A	Same as Alternative A
	Continue research on and monitor HB wallflower populations on HBNWR	Same as Alternative A and conduct research on cryptogamic mat and interactions between it and endemic insects	Same as Alternative B
	Seek agreements with adjacent landowners to assist them in managing populations of the HB wallflower and beach layia	Same as Alternative A	Same as Alternative A
	N/A	Inventory wildlife (including invertebrates) species in dune mat/ foredune grassland habitats	Same as Alternative B
Dune Swale	On LDU, MDU and TBU, maintain 67 acres of dune swale habitat	ON LDU, MDU and TBU, restore 67 acres of dune swale habitat and:	Same as Alternative B except within 10 years
	N/A	Inventory wildlife (including invertebrates) species in dune swale habitats	Same as Alternative B except within 10 years
Dune Riparian/Swamp	On the MDU and LDU, maintain 33 acres of dune riparian/swamp	On the MDU and LDU, maintain and restore 33 acres of dune riparian/ swamp within 10 years	Same as Alternative B except within 5 years
	N/A	Inventory wildlife (including invertebrates) in dune riparian swamp habitat	Same as Alternative B and on MDU and LDU after wildlife inventory enhance dune riparian/swamp
	N/A	Conduct continued research on neo-tropical migrant birds with partners	Same as Alternative B

Issue Area	Alternative A (*No Action Alternative*)	Alternative B	Alternative C (*Preferred Alternative*)
Coniferous Dune Forest	On the MDU and LDU, maintain and restore 180 acres of coniferous dune forest	Same as Alternative A and:	Same as Alternative B and:
	N/A	Within 10 years, restore MDU forest margins to native coniferous dune forest	Within 5 years, restore MDU forest margins to native coniferous dune forest
	Restore plant communities by removing and revegetating little-used trails throughout the forest	Same as Alternative A except within 10 years	Same as Alternative A except within 5 years
	N/A	Pursue funding for partners to research coniferous dune forest ecology including tree wind-fall events	Same as Alternative B
	N/A	Pursue funding for partners to research neo-tropical migrant birds	Same as Alternative B
	N/A	Inventory wildlife (including invertebrates) of coniferous dune forest habitats	Same as Alternative B
	N/A	N/A	Grow or identify local sources for restoration plant materials
Goal 3: Conserve and restore all Refuge habitats through the prevention and control of invasive plants and animals.			
General Invasive Species Management Program Actions	On TBU, work with the Refuge invasives program and/or YCC and CDF to remove all species of invasive plants	Same as Alternative A	Same as Alternative A
	Monitor and strategically remove invasive plants as resources permit	Expand the existing volunteer program to control high priority target invasive plants	Same as Alternative B and:
	Coordinate with volunteer and partners to control invasive plants on HBNWR and adjacent lands	Same as Alternative A	Same as Alternative A
	N/A	N/A	Develop a Hazard Analysis and Critical Control Point Plan to prevent establishment of new invasive species

Issue Area	Alternative A (*No Action Alternative*)	Alternative B	Alternative C (*Preferred Alternative*)
	Participate in local weed management area group that coordinates invasive plant management programs among 20 organizations	Same as Alternative A and pursue grant funding for partner invasive plant control program and implement if feasible	Same as Alternative B
	N/A	N/A	Create and implement an IPM step-down plan for the entire Humboldt Bay NWR
	N/A	N/A	Pursue grant funding to contract for invasive plant removal and implement if feasible
Salmon Creek Delta Restoration and Salt Marsh Habitat	Finalize IPM plan for invasive plant management plan	Same as Alternative A and control high priority target plant species to a maintenance level of ongoing control	Same as Alternative B and eradicate Spartina from HBNWR and work with partners on plan to eradicate from Humboldt Bay area
Freshwater and Brackish Marsh (FBM)	On HSU, maintain 150 acres of FBM through control of invasive plants	Same as Alternative A	Same as Alternative A
Riparian Swamp Habitat	Remove 20 acres of non-native trees	Same as Alternative A	Same as Alternative A
	Use IPM techniques to control the spread of non-native trees	Same as Alternative A	Same as Alternative A
Eelgrass and Mudflat Habitat	Continue partnerships for monitoring and research on invasive species that may affect eelgrass	Same as Alternative A	Same as Alternative A
Dune Swale	Implement large-scale eradication experiments on invasive plants in dune swale habitat	Same as Alternative A	Same as Alternative A
Dune Riparian/Swamp	Work with volunteers to complete forest invasive plants removal from dune riparian/swamp	Same as Alternative A	Same as Alternative A
	Monitor and treat new occurrences of forest invasive plants from dune riparian/swamp	Same as Alternative A	Same as Alternative A
Coniferous Dune Forest	Survey for and control invasive plants as resources permit	Same as Alternative A and pursue funding to bring all dune riparian/swamp invasives to a maintenance stage	Same as Alternative B

Issue Area	Alternative A (*No Action Alternative*)	Alternative B	Alternative C (*Preferred Alternative*)
	Work with YCC, CCC, CDF, partners, and volunteers to complete removal of invasive plants in coniferous dune forest	Same as Alternative A	Same as Alternative A
Goal 4: Promote long-term viability of the Humboldt Bay estuarine and dune ecosystems through ecosystem-based management coordinated with both public and private partners around the bay.			
Ecosystem Management	Continue participation on ecosystem based management collaborations	Same as Alternative A and:	Same as Alternative B, except:
	N/A	Within 5 years devote an additional 1/4 FTE to serve an increased role in ecosystem-based management collaborations	Within 2 years devote an additional 1/4 FTE to serve an increased role in ecosystem-based management collaborations
	N/A	Create a combined AFWO/ NWR position to work on conservation partnerships and ecosystem based outreach	Same as Alternative B
Special Status Species (*Humboldt Bay wallflower and beach layia*)	Support recovery efforts of the HB wallflower and beach layia on Humboldt Bay NWR through restoration of 14 acres on MDU and 22 acres on TBU	Same as Alternative A and:	Same as Alternative B, except: within 5 years reintroduce HB wallflower and beach layia to unoccupied habitat at LDU (35 acres) and restored habitat at MDU and LDU
	N/A	Work with partners to protect South Spit, Elk River Spit, Samoa airport, and unprotected Manila populations of Humboldt Bay wallflower and beach layia	Same as Alternative B
	N/A	Work with AFWO to implement the Coastal Plants Recovery Plan on and off Humboldt Bay NWR	Same as Alternative B
	N/A	N/A	Within 10 years, pursue protection of 22 acres existing and 30 acres potential (restorable) habitat within approved Refuge boundary
	N/A	N/A	Once protected carry out restoration of habitats and re-introduce populations of native endangered plants

Issue Area	Alternative A (*No Action Alternative*)	Alternative B	Alternative C (*Preferred Alternative*)
	Re-introduce HB wallflower on MDU, part of LDU, and on TBU	Same as Alternative A	Same as Alternative A
	Seek coop. agreements with adjacent landowners to assist them in managing populations of the HB wallflower and beach layia on private lands	Same as Alternative A	Same as Alternative A
	Use existing methods to re-introduce wallflowers	Same as Alternative A	Same as Alternative A
	N/A	Work with City of Eureka and CDFG to develop access and interpretive infrastructure to reduce trampling of ESA-listed plants	Same as Alternative B
	N/A	Work with partners to monitor Elk River and South Spit population of HB wallflower	Same as Alternative B
	N/A	Work with partners to protect South Spit and Elk River Spit populations, of ESA-listed plants from deer browsing, trampling, and other human impacts	Same as Alternative B
	N/A	Work with partners (City of Eureka to increase habitat at EDPA and Samoa airport populations	Same as Alternative B
	N/A	Work with FOD, MCSD to increase viability of Manila populations	Same as Alternative B
	N/A	N/A	Pursue protection of remaining habitat for ESA-listed species within the HBNWR approved boundary through cooperative agreements, easements, donations, or acquisition
Goal 5. Provide public with accessible, safe, high-quality wildlife-dependent recreation opportunities to enhance public appreciation and understanding of fish, wildlife, plants, and habitats of Humboldt Bay and associated watersheds.			
Visitor Services - Wildlife Observation and Photography	Provide 20,000 annual, safe wildlife observation and photography visitor opportunities by land and water trails	Provide 30,000 annual, safe wildlife observation and photography visitor opportunities by land and water trails	Provide 35,000 annual, safe wildlife observation and photography visitor opportunities by land and water trails

Issue Area	Alternative A (*No Action Alternative*)	Alternative B	Alternative C (*Preferred Alternative*)
	Maintain 2 miles of dune units trails	On SCU, improve to wheelchair accessible 0.25 mile of existing trail from parking lot to kiosk to increase wildlife viewing opportunities	On SCU, improve to wheelchair accessible 1.5 miles of existing trail (Shorebird Loop trail)
	N/A	On MDU, improve to wheelchair accessible 0.25 mile of existing trail to the overlook (Railroad Berm trail)	On MDU, improve to wheelchair accessible 0.5 mile of existing trail (Railroad Berm trail)
	N/A	N/A	On HSU, improve to wheelchair accessible 1.5 miles of exiting trail (Hookton Slough trail)
	Maintain wheelchair accessibility of visitor center and associated boardwalk	Same as Alternative A	Same as Alternative A
	Increase law enforcement on the refuge by contract or by support from other Service law enforcement	Same as Alternative A	Same as Alternative A
	N/A	Install a wildlife camera with feed back to the Visitor Center	Same as Alternative B
	N/A	Offer seasonally guided hikes through otherwise closed trails	Same as Alternative B
	N/A	Increase seasonal hiking opportunities around the hunt area by improving trails	N/A
	N/A	Add a non-motorized boat launch at the Ma-le'l Dunes Unit, if feasible	N/A
	N/A	On SCU, add wheelchair accessible photo blind	Same as Alternative B
Visitor Services - Environmental Education and Interpretation	Maintain wildlife-dependent educational opportunities for 4 school or community groups per month	Maintain wildlife-dependent educational opportunities for 6 school or community groups per month	Maintain wildlife-dependent educational opportunities for 8 school or community groups per month
	Offer 20,000 annual visitor opportunities for interpretive experiences on HBNWR lands and off refuge	Offer 30,000 annual visitor opportunities for interpretive experiences on HBNWR lands and off refuge	Offer 35,000 annual visitor opportunities for interpretive experiences on HBNWR lands and off refuge
	Offer guided natural history walks on LDU and MDU (once per month)	Same as Alternative A	Same as Alternative A

Issue Area	Alternative A (*No Action Alternative*)	Alternative B	Alternative C (*Preferred Alternative*)
	Coordinate with FOD, which leads a restoration work day once per month on MDU	Same as Alternative A	Same as Alternative A
	Continue to host class tours on LDU and MDU	Same as Alternative A	Same as Alternative A
	N/A	Facilitate teacher training so teachers could lead environmental education field trips	Same as Alternative B
	N/A	Work with school districts to implement new Schoolyard Habitats Program	Same as Alternative B
	Complete the South Bay Historic Hunt Cabin	Same as Alternative A	Same as Alternative A
	N/A	Construct or convert the SCU barn into a covered outdoor structure for environmental education activities	Same as Alternative B
	N/A	Assist schools in visiting refuges (arranging shuttle busses, etc.)	Same as Alternative B
	N/A	Expand the outdoor youth day to a multi-day event	Same as Alternative B
	N/A	On SCU establish a children's outdoor exploration area ("connecting people with nature")	Same as Alternative B
Visitor Services - Outreach/Friends and Partners	Collaborate with regional partners to host at least 1 regionally based environmental education field trip, workshop, seminar, or study course each year	Collaborate with regional partners to host at least 2 regionally based environmental education field trip, workshop, seminar, or study course each year	Same as Alternative B
Visitor Services - Hunting	Maintain existing waterfowl, coot and snipe hunting program to accommodate 1,200 hunter day use opportunities per year on SCU	Same as Alternative A, and:	Same as Alternative A and implement 2008 Waterfowl Hunt Plan (Appx. C): open limited areas of the MDU to waterfowl, coot, and snipe hunting and retrieval and provide 2 additional youth only hunting days on SCU

Issue Area	Alternative A (*No Action Alternative*)	Alternative B	Alternative C (*Preferred Alternative*)
	N/A	Provide additional undisturbed area for wildlife and reduce potential for hunter/ nonhunter conflicts by closing Teal Island and Hookton Slough areas to overwater hunting	N/A
	Increase law enforcement on the HBNWR by contract or by support from other Service law enforcement	Same as Alternative A	Same as Alternative A
	Modify pit blinds to prevent stranding of wildlife	Same as Alternative A	Same as Alternative A
	Post additional boundary signs on ESU, JCU,TBU, Egret Island, Teal Island, and HSU	Same as Alternative A	Same as Alternative A
Visitor Services - Fishing	Maintain existing sport fisheries program	Same as Alternative A and:	Implement 2008 Sport Fishing Plan (Appx. D)
	N/A	Increase signage at allowable sport fishing sites and outreach	Same as Alternative B
Goal 6. In cooperation with tribal representatives, identify and protect tribal cultural resources on the Humboldt Bay NWR. In addition, assess and manage Refuge's more recent cultural resources and structures.			
Cultural Resources - Management	Continue managing for and conserving HBNWR cultural resources in coordination with the Wiyot Tribe, Blue Lake Rancheria, Bear River Band of Rohnerville Rancheria and the FWSs Regional Archaeologist	Create and implement a basic Cultural Resources Management capability at HBNWR to respond to basic compliance requirements	Same as Alternative A
	Work with the Wiyot Tribe, Blue Lake Rancheria, and Bear River Band of Rohnerville Rancheria to develop an MOU for resource management issues	Same as Alternative A	Same as Alternative A
	Incorporate cultural resource values, issues, and requirements into design and implementation of the other habitat, wildlife, and public use activities and strategies conducted by the HBNWR	Same as Alternative A	Same as Alternative A

Issue Area	Alternative A (*No Action Alternative*)	Alternative B	Alternative C (*Preferred Alternative*)
	N/A	Develop and implement a plan to survey the refuge for both previously recorded and newly identified cultural resources	Same as Alternative B
	N/A	Assess costs to keep barn and other structures on SCU and LDU in use	Same as Alternative B
Cultural Resources - Education	Continue current level of cultural resources interpretation	Within 10 years develop, in partnership with the Wiyot Tribe, Blue Lake Rancheria, Bear River Band of Rohnerville Rancheria and other preservation partners, a cultural resources overview of the HBNWR	Same as Alternative B
	N/A	Develop interpretive displays on the Headquarters Unit that illustrate traditional dwellings, various subsistence strategies and the overall lifestyle of local American Indian tribes	Same as Alternative B
Cultural Resources - Coordination	Work with the Wiyot Tribe, Blue Lake Rancheria, Bear River Band of Rohnerville Rancheria to restore habitats of important native plants and to harvest native plant foods (for traditional non-commercial purposes)	Same as Alternative A	Same as Alternative A
	Review and reissue, if appropriate, any special use permits for traditional activities such as plant collecting for basket weaving	Same as Alternative A	Same as Alternative A

N/A = Not applicable to and not included in that Alternative.

ACG=Aleutian cackling goose; HB=Humboldt Bay; HBNWR = Humboldt Bay NWR; HSU=Hookton Slough Unit; LDU=Lanphere Dunes Unit; MDU=Ma-le'l Dunes Unit; SCU=Salmon Creek Unit; TBU=Table Bluff Unit; WSU=White Slough Unit.

Acreages indicated in the alternative descriptions that follow are approximate.

Alternative A for Humboldt Bay NWR: No Action

Under Alternative A, the Refuge would continue to be managed as it has been in the recent past (see Chapter 3 of the CCP). The focus of the Refuge would remain the same: to provide enhancement, restoration, and management of a diversity of wetland and upland habitats for the benefit of all of the natural resources that those habitats help sustain. The Refuge would continue to provide wildlife dependent recreation opportunities, including hunting, wildlife observations and photography, environmental education and interpretation, and hunting. Existing staffing and funding levels would remain approximately the same. In addition to actions described above in Features Common to All Alternatives for Humboldt Bay NWR, Alternative A would include the following. Figures E-2 through E-6 show graphical representations of the areas affected for each of the habitat management alternatives. The Summary of Alternatives table, above, provides a comparison of the actions in each alternative.

Salmon Creek Delta Restoration

Under Alternative A, the Refuge would adaptively manage 60 acres of Salmon Creek overflow and 50 acres adjacent to the main channel to meet the goals of Phase I of the Salmon Creek Restoration project. Adaptive management includes monitoring species and sediment transport in Salmon Creek. The monitoring results would then be used to guide management activities.

Salt Marsh Habitat

Under Alternative A, the Refuge would:

- manage 313 acres of existing coastal salt marsh habitat
- repair the dike at White Slough Unit to allow for planned restoration and
- remove the remaining dike on west side of Table Bluff Unit

Freshwater and Brackish Marsh Habitat (FBM)

Under Alternative A, the Refuge would:

- continue to maintain all levees and conduct minimal repairs of existing levees as needed to maintain their functionality; levee work would be done by Refuge staff or contractors
- on the White Slough Unit, the Refuge would repair the perimeter dike within 2 years and passively maintain 50 acres of freshwater and brackish marsh in the northern and western areas
- on the Hookton Slough Unit, maintain 150 acres of freshwater and brackish marsh through control of invasive plant species
- on the Hookton Slough Unit, maintain hydrologic flushing to minimize mosquito breeding habitat
- on the Table Bluff Unit, maintain 25 acres of brackish and freshwater marsh
- on the Salmon Creek Unit, the Refuge would maintain and enhance 630 acres of seasonal freshwater and brackish marsh primarily through management and control of invasive plants.
- on the Salmon Creek Unit, the Refuge would continue to maintain and enhance 270 acres of short-grass pasture through control of invasive species, seeding, application of lime, and grazing, as needed.
- continue to use a cooperative land management agreement to manage grasslands through a combination of grazing, mowing, and haying
- continue soil testing and add lime when necessary to raise soil pH
- continue seasonally appropriate mowing to maintain short-grass pasture and control thistle
- promote plant communities that support Aleutian cackling geese by seeding, if needed

Riparian Swamp Habitat

Under Alternative A, the Refuge would:

- on the east side of the White Slough Unit, manage 35 acres of existing riparian swamp habitat and re-vegetate an additional 6 acres with riparian swamp vegetation
- continue selective removal of 20 acres of non-native trees, including eucalyptus, Monterey pine, and Monterey cypress trees. The Refuge would only remove non-native trees as variable staff and funding resources permit. This would result in removal of non-native trees within the life of the CCP (15 years).
- continue to work with volunteer groups or partners to complete small-scale plantings of native vegetation in areas where non-native trees are removed
- enhance riparian swamp habitat by planting native under story plants and providing deer browse protection on new plantings

Eelgrass and Mudflat Habitat
Under Alternative A, the Refuge would:
- continue to participate in ongoing partnerships to conserve and manage eelgrass and mudflat habitat for the long-term health of the bay
- monitor potential effects to eelgrass beds from the ongoing Salmon Creek Restoration project
- continue partnership with the HBEBM program for eelgrass and mudflat habitat

Floodplain Management
Under Alternative A, the Refuge would:
- continue to manage the Humboldt Bay NWR floodplain land in a manner consistent with local, State, and Federal guidelines; and flood management, sediment, and erosion control and water quality objectives
- continue to maintain all levees and would conduct minimal repairs of existing levees as needed to maintain their functionality
- implement habitat improvement strategies in a manner that does not worsen local or regional flooding, water quality, or erosion

Dune Mat/Foredune Grassland Habitat
Under Alternative A, the Refuge would:
- on the Lanphere Dunes Unit, maintain 125 acres of dune mat/foredune grassland plant communities
- on the Ma-le'l Dunes Unit, part of Lanphere Dunes Unit, and on Table Bluff Unit, re-introduce Humboldt Bay wallflower
- continue research and monitoring of Humboldt Bay wallflower populations on the Humboldt Bay NWR
- seek cooperative agreements with adjacent landowners to assist them in managing populations of the Humboldt Bay wallflower and beach layia
- continue monitoring and re-introductions, as described above in Features Common to All Alternatives

Dune Swale
Under Alternative A, the Refuge would:
- on the Lanphere Dunes, Ma-le'l Dunes, and Table Bluff Units, maintain 67 acres of dune swale plant communities

Dune Riparian/Swamp
Under Alternative A, the Refuge would:
- on the Ma-le'l and Lanphere Dunes Units, maintain a total of 33 acres of dune riparian/swamp habitat

Coniferous Dune Forest
Under Alternative A, the Refuge would:
- on the Ma-le'l and Lanphere Dunes Units, maintain 180 acres of coniferous dune forest habitat
- within 15 years, restore native plant communities to remove casual human trails throughout the coniferous forest

Invasive Species (Integrated Pest Management)
Under Alternative A, the Refuge would implement the following management activities (actions are listed by general program actions or by habitat type below).

General Invasive Species Management Program Actions
- on Table Bluff Unit, work with the Refuge invasives program and/or YCC and CDF to remove all species of invasive plants
- monitor and strategically remove invasive plants as resources permit
- continue coordination and collaboration with volunteers and partners from organizations such as the Friends of the Dunes, Friends of the Humboldt Bay NWR, the Fortuna Creeks Project, CCC, and CDF to control invasive plants on Humboldt Bay NWR and adjacent lands
- participate in the Humboldt-Del Norte County Weed Management Area group that coordinates and implements invasive plant management programs among 20 agencies and organizations

Salmon Creek Delta and Salt Marsh Habitat:
- finalize and implement an invasive plant management (IPM) plan

Freshwater and Brackish Marsh:
- on Hookton Slough Unit, maintain 150 acres of freshwater and brackish marsh through the control of invasive plants

Riparian Swamp Habitat:
- remove 20 acres of non-native trees from riparian swamp habitat
- use a combination of mechanical and chemical (IPM) techniques to control the spread of non-native trees

Eelgrass and Mudflat Habitat:
- continue partnerships for monitoring and research on invasive species that may affect eelgrass

Dune Habitats
- implement large-scale eradication experiments on existing invasive plants in the dune swale plant community
- work with volunteers to complete removal of forest invasive plants from the dune riparian/swamp
- monitor and treat new occurrences of forest invasive plants from the dune riparian swamp
- survey for and control of new occurrences of forest invasive plants as resources permit
- work with YCC, CCC, CDF, partners, and volunteers to complete removal of invasive plants in the coniferous dune forest

Ecosystem Management
Under Alternative A, the Refuge would continue to coordinate participation with many partners to assure that habitat and species management efforts on Humboldt Bay NWR support those of related Humboldt Bay ecosystem-based management collaborations, as staff time and resources permit.

Special Status Species (Humboldt Bay wallflower and beach layia)
Under Alternative A, the Refuge would continue to support recovery efforts for the Humboldt Bay wallflower and beach layia on the Humboldt Bay NWR through the following.
- complete habitat restoration on 14 acres of Ma-le'l Dunes Unit and 22 acres on Table Bluff Unit
- reintroduce the wallflower and layia to Ma-le'l Dunes and Table Bluff Units, and part of Lanphere Dunes Unit
- seek to develop cooperative agreements with adjacent landowners to assist them in managing populations of the Humboldt Bay wallflower and beach layia on privately owned lands
- use existing methods to re-introduce wallflowers

Visitor Services - Wildlife Observation and Photography
Figures E-7 and E-8 show a graphical representation of the Visitor Services features described in the alternatives.

Under Alternative A, the Refuge would continue to maintain current opportunities for wildlife observation and photography. The Refuge would:
- provide for up to 20,000 annual, safe wildlife observation and photography visitor opportunities on Humboldt Bay NWR by land and water trails
- maintain 2 miles of trails on the Lanphere and Ma-le'l Dunes Units
- on Salmon Creek Unit, maintain wheelchair accessibility to the Richard J. Guadagno Office and Visitor Center and associated boardwalk
- increase law enforcement on the Refuge by contract or support from other Service law enforcement staff

Visitor Services - Environmental Education and Interpretation
Environmental education and interpretation opportunities on the Humboldt Bay NWR would continue to be offered by Refuge staff and volunteers. For Alternative A, the Refuge would:
- maintain wildlife-dependent educational opportunities for 4 school or community groups per month.
- offer up to 20,000 annual visitor opportunities for interpretive experiences on and off Refuge lands
- offer guided natural history walks once per month on Lanphere Dunes Unit and Ma-le'l Dunes Unit
- coordinate with Friends of the Dunes, which leads a restoration work day once per month on Ma-le'l Dunes Unit
- continue to host class tours on Lanphere Dunes Unit and Ma-le'l Dunes Unit
- complete the South Bay Historic Hunt Cabin
- conduct a variety of outreach efforts including a volunteer services program

Visitor Services – Outreach/Friends and Partners
For Alternative A, the Refuge would collaborate with regional partners to host at least 1 regionally based environmental education field trip, workshop, seminar, or study course each year

Visitor Services - Hunting
For Alternative A, the Refuge would continue to be managed consistent with the existing the 1990 Humboldt Bay NWR Sport Hunting Plan, with no changes. Over the life of the CCP, the Refuge would maintain the existing waterfowl, coot, and snipe hunting program to accommodate 1,200 hunter day use opportunities per year on the Salmon Creek Unit.
- increase law enforcement on the Humboldt Bay NWR by contract or through support from other Service law enforcement staff
- modify pit blinds to prevent stranding of wildlife
- post additional boundary signs on Eureka Slough Unit, Jacoby Creek Unit, Table Bluff Unit, Egret Island, Teal Island, and Hookton Slough Unit

Visitor Services - Fishing
For Alternative A, the fishing on the Refuge would continue to be managed consistent with the existing 1992 Humboldt Bay NWR Fishery Management Plan, with no changes. The existing sports fisheries program would be maintained.

Most fishing in Humboldt Bay occurs from boats on navigable waters. Currently, boaters can access Mad River Slough from the existing boat ramp on Lanphere Road or from Samoa Boulevard. Fishing will also continue to be permitted from the Hookton Slough boat dock and off the Hookton Slough trail, west of the designated parking lot. This area is known as the "Hookton Slough Shoreline Fishing Trail". A California fishing license is required to fish on Hookton Slough, even from the dock because the dock does not quality as a "public fishing pier" under State of California Sport Fishing Regulations. Refuge staff estimates that 100 to 250 people anglers visit the Refuge each year, including families often with children who also fish. Fishing on the Refuge is primarily for species in the shark family and most successful with a high tide. Alcohol is banned on the Refuge and therefore is not allowed at fishing locations. The non-tidally influenced areas (dikes and seasonal wetlands) will be closed to fishing to provide disturbance-free resting and foraging areas for migratory birds. Anglers will be monitored on an opportunistic basis to determine if any wildlife disturbance is occurring. Refuge staff will respond appropriately to observed disturbances to fulfill the multiple purposes of the Refuge. Shell fishing is not allowed on the Refuge. Refuge staff directs visitors inquiring about shell fishing (for clams) to go to more productive locations off-Refuge.

As with hunting, these designated fishing areas are subject to Federal and State fishing laws and regulations. For seasons, limits, and other restrictions, refer to the State of California Sport Fishing Regulations.

Cultural Resources - Management
For Alternative A, the Refuge would:
- continue managing for and conserving Humboldt Bay NWR's cultural resources by consulting with the Wiyot Tribe, Blue Lake Rancheria, Bear River Band of Rohnerville Rancheria, and the Service's California and Nevada Regional Archaeologist to collect relevant cultural resource background information prior to conducting projects
- work with Wiyot Tribe, Blue Lake Rancheria, and Bear River Band of Rohnerville Rancheria to develop a Memorandum of Understanding for resource management issues
- incorporate cultural resource values, issues, and requirements into design and implementation of the other habitat, wildlife, and public use activities and strategies conducted by the Humboldt Bay NWR

Cultural Resources - Education
For Alternative A, the Refuge would:
- continue current levels of cultural resources interpretation at Humboldt Bay NWR

Cultural Resources - Coordination
For Alternative A, the Refuge would:
- work with Wiyot Tribe and Blue Lake Rancheria and Bear River Band of Rohnerville Rancheria on projects to restore habitats of culturally important native plants and to harvest native plant foods (for traditional, non-commercial purposes)
- review and reissue, if appropriate, any special use permits for traditional activities such as plant collecting for basket weaving

Alternative B for Humboldt Bay NWR

Figures E-2 through E-6 show graphical representations of the areas affected for each of the habitat management alternatives. The Summary of Alternatives table, above, provides a comparison of the actions in each alternative.

Salmon Creek Delta Restoration
In addition to completing actions described under Alternative A, within 3 years of CCP approval, the Refuge would also implement Phase II of the Salmon Creek Restoration project. The goal of the Salmon Creek Restoration Project is to restore estuarine habitat (associated plant communities) and function. The project objectives include: 1) Relocate upper reach of Salmon Creek channel within the Refuge, which currently flows through a ditch. The new channel would be in the upper reach of a new tidally influence area and include a stable channel form, complexity and sinuosity, large wood, and efficient routing of sediment and flood waters; 2) Construct off-channel estuarine wetlands and side-channels in upper reach for salmonid rearing habitat and channel maintenance; and 3) Screen existing high-flow water diversion to eliminate stranding.

For Alternative B, the Refuge would:
- relocate a reach of the Salmon Creek channel that currently flows through a linear ditch (from the refuge boundary to the first diversion structure) into a natural, meandering channel. Restoring this reach to a meandering channel would include excavation and restoration plantings on approximately 1,500 linear feet of the historic Salmon Creek channel that has been filled in, allowing the creek to more efficiently route sediment and flood waters. The new channel would be in the upper reach of a new tidally influenced area and include a stable channel form, complexity and sinuosity, and efficient routing of sediment and flood waters
- use excavated material on the Refuge for salt marsh restoration or dike maintenance
- replant native, riparian forest vegetation on the sides of the new channel, to a minimum width of 100 feet
- install a fish screen in the newly excavated channel to reduce fish stranding

Salt Marsh Habitat
In addition to actions described under Alternative A, the Refuge would restore historic, natural processes to portions of the Humboldt Bay NWR. For Alternative B, the Refuge would:
- on the White Slough Unit, restore 35 acres of native salt marsh by removing existing dikes on the White Slough Unit and using the dike material and other appropriate, local fill material to raise the White Slough Unit elevation.
- on the Salmon Creek Overflow marsh plain, raise 60 acres to create additional salt marsh and to restore the tidal prism. If feasible, the Refuge would raise areas of the White Slough Unit and Salmon Creek overflow marsh plain through a multi-step process. Prior to adding clean fill soil, native salt marsh plants would be salvaged and approximately 12 inches of topsoil would be removed from the site. The topsoil and salvaged plants would be stored on the Humboldt Bay NWR. Once topsoil had been removed, fill material would be spread on the marsh plain to raise the elevation of the plain. After fill material is placed to raise the marsh plain, the topsoil would be spread on top of the fill material. Finally, the salvaged native salt marsh plants and additional native plants would be used to vegetate the raised marsh plain.

Also for Alternative B, the Refuge would restore through adaptive management a total of 125 acres of native salt marsh including:
- on White Slough Unit, restore 35 acres to native salt marsh
- on Hookton Slough Unit, restore 90 acres to native salt marsh
- raise tidal elevations of 60 acres of existing mudflat with clean fill, and plant with native or propagated salt marsh vegetation

Freshwater and Brackish Marsh Habitat (FBM)
For Alternative B, the Refuge would:
- within 2 years, on the White Slough Unit, repair the perimeter dike (as in Alternative A), but maintain 23 acres of FBM in the north and west areas of the White Slough Unit (instead of 50 acres as in Alternative A)
- on White Slough Unit, restore 4 acres of FBM
- work with Caltrans to de-channelize Chism Creek so that it enters the west area of the White Slough Unit rather than directly flowing through a diversion ditch into Humboldt Bay
- within 7 years, at the east and west ends of Hookton Slough Unit, enhance and restore 80 acres of freshwater and brackish marsh
- within 7 years, on Salmon Creek Unit, enhance and restore 20 acres of freshwater and brackish marsh
- on Salmon Creek Unit use seasonally appropriate mowing to restore 92 acres of wetland areas to encourage growth of short-grass species favorable to Aleutian cackling goose
- on middle portion of Hookton Slough Unit, use seasonally appropriate mowing to restore 38 acres of wetland areas to encourage growth of short-grass species favorable to Aleutian cackling goose
- on the Hookton Slough Unit, enhance native grasslands through seeding and other cultivation activities, such as mowing and controlling invasive plants
- use existing water control structures to allow muted tidal exchange and to allow fish passage in the eastern and western areas of the Hookton Slough Unit
- on Hookton Slough Unit and Salmon Creek Unit, maintain and enhance 270 acres of grassland and restore 130 acres of wetland areas to short-grass pasture to improve Aleutian cackling goose habitat
- on the Salmon Creek Unit, construct low contour interior levees to create independent water management areas to increase wetlands
- within 7 years, on the Table Bluff Unit, maintain 25 acres of freshwater and brackish marsh
- on the Table Bluff Unit, restore 13 acres of short-grass pasture vegetation to brackish marsh by removing invasive species such as thistle (*Cirsium* spp.) and invasive fireweed (*Erechtites* sp.) and controlling non-native pasture grasses such as common velvetgrass (*Holcus lanatus*); then planting native brackish marsh species such as dune rush (*Juncus lesuerii*), and Lyngbye's sedge (*Carex lyngbei*)

Riparian Swamp Habitat
For Alternative B, the Refuge would conduct the same management actions for riparian swamp habitat as that described under Alternative A, except that under Alternative B the work would be done within 5 years (instead of in 15 years as in Alternative A). For Alternative B, the Refuge would:
- within 5 years, replace 20 acres of non-native trees with riparian swamp vegetation native to the area
- implement a cooperative agreement with interested parties to remove non-native trees and assist with the new plantings
- within 5 years, enhance and restore 14 acres of riparian swamp habitat in the eastern area of the White Slough Unit

Eelgrass and Mudflat Habitat
For Alternative B, the Refuge would conduct the same management actions for eelgrass and mudflat habitat as that described under Alternative A, and:
- participate in ongoing and explore new partnerships to conserve and manage eelgrass and mudflat habitat for long-term health
- pursue a memorandum of understanding with the Humboldt Bay Harbor Recreation and Conservation District and the California Department of Fish and Game to conserve inter-tidal areas within the approved refuge boundary
- pursue additional funding for research and conservation through the Service's coastal program to contribute to HBEBM program

Floodplain Management
For Alternative B, the Refuge would conduct the same floodplain management as that described under Alternative A and, in addition, the Refuge would:
- within 10 years, work toward achieving the relevant water quality objectives as described in Section 3 of the North Coast Basin Plan objectives for the benefit of fish and wildlife resources North Coast Basin Plan (NCRWQCB 2007) objectives for inland surface waters, enclosed bays, and estuaries.

- develop a long-term water quality monitoring program for nonpoint sources of pollution from off-Refuge entering the Humboldt Bay NWR
- with partners, develop a long-term water quality monitoring program to document effects of sediment flushing from Salmon Creek on eelgrass beds in southern Humboldt Bay.

Dune Mat/Foredune Grassland Habitat

For Alternative B, the Refuge would conduct the same management actions for dune mat/foredune grassland habitat as that described under Alternative A, and in addition, the Refuge would:

- on all suitable areas of the Lanphere and Ma-le'l Dunes Units restore native dune mat/foredune grassland communities
- within 5 years, on Table Bluff Unit, restore native dune mat/foredune grassland on 10 acres
- inventory wildlife (including invertebrate) species in dune mat/foredune grassland habitats.
- conduct research on cryptogamic mat and interactions between it and endemic insects

Dune Swale Habitat

For Alternative B, the Refuge would:

- within 10 years, on the Lanphere and Ma-le'l Units, restore and maintain a total of 67 acres of dune swale plant communities as follows:
  46 acres on Lanphere Dunes Unit
  21 acres on Ma-le'l Dunes Unit
- within 10 years, on Table Bluff Unit restore 25 acres of dune swale
- inventory wildlife (including invertebrate) species in dune swale habitats

Dune Riparian/Swamp Habitat

For Alternative B, the Refuge would:

- within 10 years, on the Ma-le'l and Lanphere Dunes Units, restore 33 total acres of riparian swamp habitat
- inventory wildlife (including invertebrate) species, in dune riparian/swamp habitat
- continue to collaboration with partners to conduct research on neo-tropical, migrant birds

Coniferous Dune Forest Habitat

For Alternative B, the Refuge would:

- on the Ma-le'l and Lanphere Dunes Units, maintain 180 acres of coniferous dune forest habitat
- within 10 years, restore Ma-le'l Dunes Unit forest margins dominated by European beach grass to native coniferous forest communities
- within 10 years, restore native plant communities to remove casual human trails throughout the coniferous forest (instead of within 15 years under Alternative A)
- pursue funding and collaborate with Humboldt State University to conduct research on coniferous dune forest ecology including tree wind-fall events
- pursue funding and continue research on neo-tropical migrant birds by partners
- inventory wildlife species, including invertebrates, that utilize coniferous dune forest habitat

Ecosystem Management

For Alternative B, the Refuge would:

- within 5 years, increase collaboration in Humboldt Bay ecosystem management to serve an increased role in ecosystem based management over the life of the CCP (15 years)
- coordinate with the Arcata Fish and Wildlife Office (AFWO) and combine efforts to work on conservation partnerships and ecosystem based outreach

Special Status Species (Humboldt Bay wallflower and beach layia)

For Alternative B, (as with Alternative A), the Refuge would continue to support recovery efforts for the Humboldt Bay wallflower (wallflower) and beach layia (layia), on Humboldt Bay NWR, through restoration of 14 acres of Ma-le'l Dunes habitat and restoration of 22 acres of Table Bluff habitat. In addition, for Alternative B, the Refuge would:

- work with partners to protect populations of Humboldt Bay wallflower and beach layia on the South Spit, Elk River Spit, Samoa airport, and the Manila layia

- work with the Service's AFWO Ecological Services Program to implement the Coastal Plants Recovery Plan on and off Humboldt Bay NWR
- work with City of Eureka and CDFG to develop access and interpretive infrastructure to reduce trampling of Federally protected plants
- work with partners to implement monitoring of Elk River and South Spit population of Humboldt Bay wallflower
- work with partners to protect South Spit and Elk River Spit populations of Federally-protected plants from deer browsing, trampling, and other human impacts
- work with partners (City of Eureka) to increase habitat for Federally protected plant species at EDPA and Samoa airport populations
- work with FOD, MCSD to increase viability of Manila populations of Federally-protected plants

Invasive Plant Species (Integrated Pest Management)
For Alternative B, over the life of the CCP (15 years from approval), the Refuge would implement and expand Alternative A and the existing volunteer invasive plant control program to achieve a maintenance level of control of high priority target invasive plants species. The Refuge would implement the following management activities (actions are listed by general program actions or by habitat type below).

General Invasive Species Management Program Actions:
- on Table Bluff Unit, work with the Refuge invasives program and/or YCC and CDF to remove all species of invasive plants
- monitor and strategically remove invasive plants as resources permit *and*
- expand the existing volunteer program to control high priority target invasive plants
- continue coordination and collaboration with volunteers and partners from organizations such as the Friends of the Dunes, Friends of the Humboldt Bay NWR, the Fortuna Creeks Project, CCC, and CDF to control invasive plants on Humboldt Bay NWR and adjacent lands
- participate in the Humboldt-Del Norte County Weed Management Area group that coordinates and implements invasive plant management programs among 20 agencies and organizations *and*
- pursue grant funding for a partner invasive plant control program and implement, if feasible

Salmon Creek Delta and Salt Marsh Habitat:
- finalize and implement an invasive plant management (IPM) plan *and*
- control high priority target plant species to a maintenance level of ongoing control

Freshwater and Brackish Marsh:
- on Hookton Slough Unit, maintain 150 acres of freshwater and brackish marsh through the control of invasive plants

Riparian Swamp Habitat:
- remove 20 acres of non-native trees from riparian swamp habitat
- use a combination of mechanical and chemical (IPM) techniques to control the spread of non-native trees

Eelgrass and Mudflat Habitat:
- continue partnerships for monitoring and research on invasive species that may affect eelgrass

Dune Habitats:
- implement large-scale eradication experiments on existing invasive plants in the dune swale plant community
- work with volunteers to complete removal of forest invasive plants from the dune riparian/swamp
- monitor and treat new occurrences of forest invasive plants from the dune riparian swamp
- survey for and control of new occurrences of forest invasive plants as resources permit *and* pursue funding to bring all riparian/swamp invasives to a maintenance level of control
- work with YCC, CCC, CDF, partners, and volunteers to complete removal of invasive plants in the coniferous dune forest

Visitor Services - Wildlife Observation and Photography
Figures E-7 and E-8 show a graphical representation of the Visitor Services features described in the alternatives.

For Alternative B, the Refuge would:
- provide for up to 30,000 annual, safe wildlife observation and photography visitor opportunities on Humboldt Bay NWR by land and water trails
- on Salmon Creek Unit, improve 0.25 mile of exiting trail to wheelchair accessible trail from the parking lot to the kiosk to provide additional accessible wildlife viewing opportunities from trails
- on Ma-le'l Dunes Unit, improve 0.25 mile of exiting trail to wheelchair accessible trail to the overlook to provide additional accessible wildlife viewing opportunities from trails
- install a wildlife camera with feed back, which would provide additional opportunities for wildlife observation from closed portions on the Humboldt Bay NWR to a large screen television at the Visitor Center
- increase the number of seasonally guided hikes offered through otherwise closed trail areas (led by staff or volunteer docents) and increase seasonal hiking day use opportunities around the Humboldt Bay NWR hunt area by improving trails
- add a non-motorized boat launch at the Ma-le'l Dunes Unit, if feasible
- on Salmon Creek Unit, add a wheelchair accessible photo blind by improving the existing kiosk

To ensure that water quality is not adversely affected, the Service would implement the following measures as part of the alternative. The Refuge will continue consultations with CDPH, HBHRCD, and the oyster growers regarding water quality. The plan currently calls for vault toilets to be installed at the parking area at the north end of Ma-le'l Road in compliance with all Federal, State and local water quality and sanitation requirement to protect water quality. Further, the Refuge would install signage and distribute brochures that explain the need to maintain water quality, proper disposal of waste, and the need to be responsible neighbors. The Ma-le'l Dunes Cooperative Management Area caretaker would patrol the shoreline of the Mad River Slough on a regular basis and properly dispose of any trash and waste. During the installation of the non-motorized boat launch, implementation of conservation measures (best management practices) and compliance with all applicable environmental regulations, including the Clean Water Act, would ensure that water quality is not adversely affected.

Visitor Services - Environmental Education and Interpretation
Under Alternative B, to expand upon current environmental education and interpretation opportunities, the Refuge would:
- maintain and offer wildlife-dependent educational environmental education opportunities for 6 school or community groups per month
- offer opportunities for up to 30,000 annual visitor opportunities for interpretive experiences on Humboldt Bay NWR lands and off refuge
- offer guided natural history walks once per month on Lanphere Dunes Unit and Ma-le'l Dunes Unit
- coordinate with Friends of the Dunes, which leads a restoration work day once per month on Ma-le'l Dunes Unit
- continue to host class tours on Lanphere Dunes Unit and Ma-le'l Dunes Unit
- facilitate teacher training workshops so that teachers could independently lead environmental education field trips on Humboldt Bay NWR
- work with school districts in Humboldt and Del Norte counties to implement a new national program called Schoolyard Habitats
- complete the South Bay Historic Hunt Cabin
- either construct an environmental education building large enough for up to 30 people, convert the Salmon Creek Unit barn into an environmental/cultural resources education building, or make use of another existing Refuge structure
- assist school groups in visiting Humboldt Bay NWR through chartering (i.e., shuttle buses, etc.) or providing similar transportation
- expand the annual outdoor youth day to an overnight multi-day event
- the Salmon Creek Unit in the vicinity of the Richard J. Guadagno Visitor Center, establish a children's outdoor exploration ("discovery") area to offer an additional opportunity for children to "connect with nature"

Visitor Services – Outreach/Friends and Partners
For Alternative B, the Refuge would:
- collaborate with regional partners to host at least 2 regionally based environmental education field trips, workshops, seminars, or study courses each year

Visitor Services - Hunting
For Alternative B, the Refuge would:
- continue to offer hunting opportunities on Humboldt Bay NWR as described in Alternative A and
- provide additional undisturbed areas for wildlife and reduce the potential for hunter/nonhunter conflicts by closing Teal Island and Hookton Slough areas to overwater hunting of waterfowl, coot, and snipe.

Visitor Services - Fishing
For Alternative B, the Refuge would:
- offer fishing opportunities on Humboldt Bay NWR as described in Alternative A.
- collaborate with CDFG and other local agencies and private entities to increase awareness of fishing opportunities on Humboldt Bay NWR through increased signage at all allowable sport fishing sites and public outreach.

Cultural Resources - Management
Under Alternative B, the Refuge would:
- create and implement a basic cultural resources management capability at Humboldt Bay NWR to respond to the basic compliance requirements
- work with Wiyot Tribe, Blue Lake Rancheria, and Bear River Band of Rohnerville Rancheria to develop a Memorandum of Understanding for resource management issues
- incorporate cultural resource values, issues, and requirements into design and implementation of the other habitat, wildlife, and public use activities and strategies conducted by the Humboldt Bay NWR
- develop and implement a plan to survey the Refuge for newly identified cultural resources
- assess the safety and maintenance costs to keep the barn and other old structures on Salmon Creek and Lanphere Dunes Units in use

Cultural Resources - Education
Under Alternative B, the Refuge would:
- within 10 years develop, in partnership with the Wiyot Tribe, Blue Lake Rancheria and Bear River Band of Rohnerville Rancheria and other preservation partners, a cultural resources overview of the Humboldt Bay NWR
- either construct an environmental education building large enough for up to 30 people or convert the Salmon Creek Unit barn into an environmental/cultural resources education building (same as described under Visitor Services – Environmental Education, for Alternative B, above, due to dual function)
- develop interpretive displays on the Headquarters Unit that illustrate traditional dwellings, various subsistence strategies and the overall lifestyle of local American Indian tribes

Cultural Resources - Coordination
Under Alternative B, cultural resources coordination would be identical to those described in Alternative A. For Alternative B, the Refuge would:
- work with Wiyot Tribe and Blue Lake Rancheria and Bear River Band of Rohnerville Rancheria on projects to restore habitats of culturally important native plants and to harvest native plant foods (for traditional, non-commercial purposes)
- review and reissue, if appropriate, any special use permits for traditional activities such as plant collecting for basket weaving

Alternative C for Humboldt Bay NWR: Preferred Alternative

Figures E-2 through E-6 show graphical representations of the areas affected for each of the habitat management alternatives. The Summary of Alternatives table, above, provides a comparison of the actions in each alternative.

Salmon Creek Delta Restoration
In addition to completing actions described in Alternative B, under Alternative C, within 5 years of CCP approval, the Refuge would also excavate 500 linear feet to connect the new channel to off-channel salmonid

rearing habitat (in Cattail Creek) and seek approvals to secure placement of large woody debris within Hookton Slough estuary to provide salmonids and other estuarine fish more natural conditions that include both feeding areas and refuge from predators.

Salt Marsh Habitat

For Alternative C, the Refuge would implement all of the salt marsh habitat management strategies described in Alternative B and, in addition, restore 235 acres of the 313 acres of salt marsh existing on Humboldt Bay NWR. The Refuge would restore 235 acres to native and/or muted salt marsh habitat as follows:

- restore 45 acres on the White Slough Unit
- restore 90 acres on the Hookton Slough Unit
- restore 100 acres on the Table Bluff Unit
- raise tidal elevation of a total of 100 acres of existing mudflat on or near Salmon Creek Overflow with clean fill and plant with native or propagated salt marsh vegetation (raising 40 more acres than Alternative B)

Freshwater and Brackish Marsh Habitat

All pasture lands at Humboldt Bay NWR were formerly salt marsh before they were diked. After the salt marshes were diked, they became freshwater and brackish marsh (FBM) habitat. FBM can be improved as Aleutian cackling goose habitat by increasing and/or improving short-grass pasture vegetation. Under Alternative C, the Refuge would implement some of the same strategies for FBM as in Alternative B and, in addition, for Alternative C, the Refuge would implement the following.

- within 2 years, on White Slough Unit repair perimeter dike
- on White Slough Unit, maintain 7 acres FBM
- within 7 years, on Table Bluff Unit restore 13 acres of short-grass pasture to brackish marsh, using the same strategies described under Alternative B, by removing invasive species such as thistle (*Cirsium* spp.) and invasive fireweed (*Erechtites* sp.) and controlling non-native pasture grasses such as common velvetgrass (*Holcus lanatus*); then planting native brackish marsh species such as dune rush (*Juncus lesuerii*), and Lyngbye's sedge (*Carex lyngbei*)
- on Salmon Creek Unit, maintain 270 acres of short-grass pasture and of the 270 acres enhance 100 acres for Aleutian cackling goose and other species through control of invasives, seeding, liming, and grazing
- on the Salmon Creek Unit, enhance drainage in short-grass areas to create more favorable conditions for grass and Aleutian cackling goose
- on Salmon Creek Unit, remove interior dikes around Headquarters and adjacent to Long Pond to enhance wetland values
- on Salmon Creek Unit, install a low contour levee to impound water to enhance FBM
- on the Hookton Slough Unit, implement a restoration plan that allows for muted tidal influence to central and east areas, while allowing for fish passage, salmonid rearing and tidewater goby habitat
- on Hookton Slough Unit, maintain approximately 80 acres of FBM

Riparian Swamp Habitat

Under Alternative C, riparian swamp habitat management actions would be identical to those described in Alternative B, as follows.

- on the east side of the White Slough Unit, manage 35 acres of existing riparian swamp habitat and re-vegetate an additional 6 acres with riparian swamp vegetation
- continue selective removal of 20 acres of non-native trees, including eucalyptus, Monterey pine, and Monterey cypress trees. The Refuge would only remove non-native trees as variable staff and funding resources permit. This would result in removal of non-native trees within the life of the CCP (15 years)
- continue to work with volunteer groups or partners to complete small-scale plantings of native vegetation in areas where non-native trees are removed
- enhance riparian swamp habitat by planting native under story plants and providing deer browse protection on new plantings
- within 5 years, replace 20 acres of non-native trees with riparian swamp vegetation native to the area
- implement a cooperative agreement with interested parties to remove non-native trees and assist with the new plantings
- within 5 years, enhance and restore 14 acres of riparian swamp habitat in the eastern area of the White Slough Unit

Eelgrass and Mudflat Habitat
Under Alternative C, eelgrass and mudflat habitat management actions would be identical to those described in Alternative A plus Alternative B, as follows.
- continue to participate in ongoing partnerships and explore new partnerships to conserve and manage eelgrass and mudflat habitat for the long-term health of the bay
- monitor potential effects to eelgrass beds from the ongoing Salmon Creek Restoration project
- continue partnership with the HBHRCD and HBEBM program for continued research into the ecology of eelgrass, algae, and mudflat habitats
- pursue a memorandum of understanding with the Humboldt Bay Harbor Recreation and Conservation District and the California Department of Fish and Game to conserve inter-tidal areas within the approved refuge boundary
- pursue additional funding for research and conservation through the Service's coastal program to contribute to HBEBM program

Floodplain Management
Under Alternative C, floodplain management actions would be identical to those described in Alternative B, as follows.
- continue to manage the Humboldt Bay NWR floodplain land in a manner consistent with local, State, and Federal guidelines; and flood management, sediment, and erosion control and water quality objectives
- continue to maintain all levees and would conduct minimal repairs of existing levees as needed to maintain their functionality
- implement habitat improvement strategies in a manner that does not worsen local or regional flooding, water quality, or erosion
- within 10 years, work toward achieving the relevant water quality objectives as described in Section 3 of the North Coast Basin Plan objectives for the benefit of fish and wildlife resources North Coast Basin Plan (NCRWQCB 2007) objectives for inland surface waters, enclosed bays, and estuaries
- with partners such as HBHRCD, develop or continue a long-term water quality monitoring program to document effects of sediment flushing from Salmon Creek on eelgrass beds in southern Humboldt Bay

Dune Mat/Foredune Grassland Habitat
Under Alternative C, dunemat/foredune grassland management actions would include all of those actions described in Alternative A and in Alternative B, as follows. In addition, under Alternative C the Refuge would create ongoing experimental dune blow-outs.
- on the Lanphere Dunes Unit, maintain 125 acres of dune mat/foredune grassland plant communities
- on the Ma-le'l Dunes Unit, part of Lanphere Dunes Unit, and on Table Bluff Unit, re-introduce Humboldt Bay wallflower
- continue research and monitoring of Humboldt Bay wallflower populations on the Humboldt Bay NWR
- seek cooperative agreements with adjacent landowners to assist them in managing populations of the Humboldt Bay wallflower and beach layia
- continue monitoring and native plantings (re-introductions), as described above in Features Common to All Alternatives
- on all suitable areas of the Lanphere and Ma-le'l Dunes Units restore native dune mat/foredune grassland communities
- within 5 years, on Table Bluff Unit, restore native dune mat/foredune grassland on 10 acres
- inventory wildlife (including invertebrate) species in dune mat/foredune grassland habitats
- conduct research on cryptogamic mat and interactions between the mat and endemic insects
- create ongoing experimental dune blow-outs to mimic natural disturbance and to assess the impacts on existing plant communities and special status plants on the Lanphere Dunes Unit.

Dune Swale Habitat
Under Alternative C, the Refuge would restore and maintain dune swale plant communities as described in Alternative B; however, under Alternative C all restoration work would be completed within 10 years (instead of within 15 years as in Alternative B).

On the dunes units restore and maintain a total of 67 acres of dune swale plant communities as follows:
- within 10 years, on Lanphere Dunes Unit, restore and maintain 46 acres of dune swale
- within 10 years, on Ma-le'l Dunes Unit, restore and maintain 21 acres of dune swale

and

- within 10 years, on Table Bluff Unit, restore 25 acres of dune swale habitat
- inventory wildlife (including invertebrates) species in dune swale habitat
- re-vegetate dune swales with native, local plants as needed

Dune Riparian/Swamp Habitat
Under Alternative C, the Refuge would restore dune riparian/swamp habitat as described in Alternative B, as follows; however, under Alternative C restoration work would be completed over a 5-year period (instead of over 10 years as in Alternative B). In addition, under Alternative C the Refuge would begin to implement strategies to enhance dune riparian/swamp habitat, on the Ma-le'l and Lanphere Dunes Units, once the Refuge gains a more comprehensive understanding of plant and animal species that inhabit dune riparian/swamp habitat.
- within 5 years, on the Lanphere and Ma-le'l Dunes Units, restore 33 total acres of dune riparian/swamp habitat
- inventory wildlife (including invertebrate) species, in dune riparian/swamp habitat
- continue to collaboration with partners to conduct research on neo-tropical, migrant birds

Coniferous Dune Forest Habitat
Under Alternative C, the Refuge would:
- within 5 years, restore Ma-le'l Dunes Unit forest margins dominated by European beach grass to native coniferous forest communities (instead of within 10 years as in Alternative B or within 15 years in Alternative A)
- within 5 years, restore native plant communities to remove casual human trails throughout the coniferous forest (instead of within 10 years as in Alternative B or within 15 years in Alternative A)
- pursue funding and collaborate with Humboldt State University to conduct research on coniferous dune forest ecology including tree wind-fall events
- pursue funding and continue research on neo-tropical migrant birds by partners
- inventory wildlife species, including invertebrates, that utilize coniferous dune forest habitat
- grow or identify local sources for restoration plant materials

Ecosystem Management
Under Alternative C, the Refuge would engage in ongoing ecosystem management activities as described under Alternative B. However, within 2 years the Refuge would devote additional staff time to serve an increased role in ecosystem based management collaborations for a 15 year period.

Special Status Species (Humboldt Bay wallflower and beach layia)
Under Alternative C, the Refuge would implement the same special status species management actions as described under Alternative B and, in addition, the Refuge would:
- within 5 years, reintroduce Humboldt Bay wallflower and beach layia to unoccupied habitat at Lanphere Dunes Unit (35 acres) and restored habitat at Ma-le'l Dunes Unit
- within 10 years, protect an additional 22 acres of land currently populated with Humboldt Bay wallflower (wallflower) and beach layia (layia) within the approved Refuge boundary
- within 10 years, protect 30 acres of potentially restorable habitat within the approved Refuge boundary
- once protected, carry out restoration of habitats and re-introduce populations of native endangered plants
- pursue protection of remaining habitat for Federally-protected species within the Humboldt Bay NWR approved boundary through cooperative agreements, easements, donations, or acquisition

The actions and effects analysis for the Federally listed salmonids and tidewater goby are discussed under the Salmon Creek Delta Restoration sections for each alterative.

Invasive Species (Integrated Pest Management)
Under Alternative C, over the life of the CCP (15 years from approval), the Refuge would implement all of Alternative B *and* expand management to include the additional actions as noted below. The Refuge would implement the following management activities (actions are listed by general program actions or by habitat type).

General Invasive Species Management Program Actions:
- if feasible, eradicate Spartina densiflora from Humboldt Bay NWR and work with regional partners to develop and implement a plan to eradicate *Spartina densiflora* from the greater Humboldt Bay area
- on Table Bluff Unit, work with the Refuge invasives program and/or YCC and CDF to remove all species of invasive plants
- monitor and strategically remove invasive plants as resources permit *and* expand the existing volunteer program to control high priority target invasive plants
- continue coordination and collaboration with volunteers and partners from organizations such as the Friends of the Dunes, Friends of the Humboldt Bay NWR, the Fortuna Creeks Project, CCC, and CDF to control invasive plants on Humboldt Bay NWR and adjacent lands
- participate in the Humboldt-Del Norte County Weed Management Area group that coordinates and implements invasive plant management programs among 20 agencies and organizations
- pursue grant funding for a partner invasive plant control program and implement, if feasible
- develop a Hazard Analysis and Critical Control Point Plan to prevent establishment of new invasive species
- create and implement an IPM step-down plan for the entire Humboldt Bay NWR
- pursue grant funding to contract out invasive plant removal and implement, if feasible

Salmon Creek Delta and Salt Marsh Habitat:
- finalize and implement an invasive plant management (IPM) plan *and*
- Control high priority target plant species to a maintenance level of ongoing control

Freshwater and Brackish Marsh:
- on Hookton Slough Unit, maintain 150 acres of freshwater and brackish marsh through the control of invasive plants

Riparian Swamp Habitat:
- remove 20 acres of non-native trees from riparian swamp habitat
- use a combination of mechanical and chemical (IPM) techniques to control the spread of non-native trees

Eelgrass and Mudflat Habitat:
- continue partnerships for monitoring and research on invasive species that may affect eelgrass

Dune Habitats:
- implement large-scale eradication experiments on existing invasive plants in the dune swale plant community
- work with volunteers to complete removal of forest invasive plants from the dune riparian/swamp
- monitor and treat new occurrences of forest invasive plants from the dune riparian swamp
- survey for and control of new occurrences of forest invasive plants as resources permit
- pursue funding to bring all riparian/swamp invasives to a maintenance level of control
- work with YCC, CCC, CDF, partners, and volunteers to complete removal of invasive plants in the coniferous dune forest

Visitor Services - Wildlife Observation and Photography
Figures E-7 and E-8 show a graphical representation of areas of Visitor Services features described in the alternatives.

Under Alternative C, the Refuge would expand upon current opportunities for wildlife observation and photography as described in Alternative B by implementing the following actions.
- provide for up to 35,000 annual, safe wildlife observation and photography visitor opportunities on Humboldt Bay NWR by land and water trails
- on the Salmon Creek Unit, expand wheelchair access on trails to include the entire Shorebird Loop Trail (1.5 miles) to increase wildlife viewing opportunities
- on Ma-le'l Dunes Unit, expand wheelchair access on trails to include the entire Railroad Berm Trail (0.5 miles) to increase wildlife viewing opportunities
- on the Hookton Slough Unit, expand wheelchair access on trails to include the entire Hookton Slough Trail (1.5 miles) to increase wildlife viewing opportunities

- on Salmon Creek Unit, maintain wheelchair accessibility to the Richard J. Guadagno Office and Visitor Center and associated boardwalk
- increase law enforcement on the Refuge by contract or support from other Service law enforcement staff
- install a wildlife camera with feed back, which would provide additional opportunities for wildlife observation from closed portions on the Humboldt Bay NWR to a large screen television at the Visitor Center
- increase the number of seasonally guided hikes offered through otherwise closed trail areas (led by staff or volunteer docents) and increase seasonal hiking day use opportunities around the Humboldt Bay NWR hunt area by improving trails.
- on Salmon Creek Unit, add a wheelchair accessible photo blind by modifying the existing kiosk

Visitor Services - Environmental Education and Interpretation

Under Alternative C, the Refuge would:

- offer environmental education opportunities for 8 school or community groups per month
- offer opportunities for up to 35,000 annual visitor opportunities for interpretive experiences on Humboldt Bay NWR lands and off refuge
- offer guided natural history walks once per month on Lanphere Dunes Unit and Ma-le'l Dunes Unit
- coordinate with Friends of the Dunes, which leads a restoration work day once per month on Ma-le'l Dunes Unit
- continue to host class tours on Lanphere Dunes Unit and Ma-le'l Dunes Unit
- facilitate teacher training workshops so that teachers could independently lead environmental education field trips on Humboldt Bay NWR
- work with school districts in Humboldt and Del Norte counties to implement a new national program called Schoolyard Habitats
- complete the South Bay Historic Hunt Cabin
- either construct an environmental education building large enough for up to 30 people or convert the Salmon Creek Unit barn into an environmental/cultural resources education building, or make use of another existing refuge structure
- assist school groups in visiting Humboldt Bay NWR through chartering (i.e., shuttle buses, etc.) or providing similar transportation
- expand the annual outdoor youth day to an overnight multi-day event
- the Salmon Creek Unit in the vicinity of the Richard J. Guadagno Visitor Center, establish a children's outdoor exploration ("discovery") area to offer an additional opportunity for children to "connect with nature"

Visitor Services – Outreach/Friends and Partners

Under Alternative C, the Refuge would offer opportunities identical to those described in Alternative B, as follows.

- collaborate with regional partners to host at least 2 regionally based environmental education field trips, workshops, seminars, or study courses each year

Visitor Services - Hunting

Under Alternative C, the Refuge would implement the 2008 Draft Waterfowl Hunt Plan (see Appendix C) and, in addition, the Refuge would:

- open limited areas of the Ma-le'l Dunes Unit to waterfowl, coot, and snipe hunting and/or retrieval and offer 2 additional youth only hunting days on the Salmon Creek Unit

Visitor Services - Fishing

Under Alternative C, the Refuge would implement the 2008 Draft Sport Fishing Plan (see Appendix D of the CCP). This 2008 Plan:

- offer fishing opportunities on Humboldt Bay NWR as described in Alternative A (maintains existing fishing opportunities) and
- collaborate with CDFG and other local agencies and private entities to increase awareness of fishing opportunities on Humboldt Bay NWR through increased signage at all allowable sport fishing sites and public outreach as described in Alternative B and
- creates additional fishing opportunities to the public at the end of the Cukish trail (end of the railroad berm) at the Ma-le'l Dunes Unit

Cultural Resources - Management
Under Alternative C, the Refuge would:
- continue managing for and conserving Humboldt Bay NWR's cultural resources by consulting with the Wiyot Tribe, Blue Lake Rancheria, Bear River Band of Rohnerville Rancheria, and the Service's California and Nevada Regional Archaeologist to collect relevant cultural resource background information prior to conducting projects
- work with Wiyot Tribe, Blue Lake Rancheria, and Bear River Band of Rohnerville Rancheria to develop a Memorandum of Understanding for resource management issues
- incorporate cultural resource values, issues, and requirements into design and implementation of the other habitat, wildlife, and public use activities and strategies conducted by the Humboldt Bay NWR
- develop and implement a plan to survey the Refuge for both previously recorded and newly identified cultural resources

Cultural Resources - Education
Under Alternative C, cultural resources education actions would be identical to those described in Alternative B, as follows.
- within 10 years develop, in partnership with the Wiyot Tribe, Blue Lake Rancheria and Bear River Band of Rohnerville Rancheria and other preservation partners, a cultural resources overview of the Humboldt Bay NWR
- either construct an environmental education building large enough for up to 30 people, convert the Salmon Creek Unit barn into an environmental/cultural resources education building, or make use of another existing Refuge structure (same as described under Visitor Services – Environmental Education/ Interpretation, for Alternative B, above, due to dual function)
- develop interpretive displays on the Headquarters Unit that illustrate traditional dwellings, various subsistence strategies, and the overall lifestyle of local American Indian tribes

Cultural Resources - Coordination
Under Alternative C, cultural resources coordination actions would be identical to those described in Alternative B (which is also identical to Alternative A), as follows.
- work with Wiyot Tribe and Blue Lake Rancheria and Bear River Band of Rohnerville Rancheria on projects to restore habitats of culturally important native plants and to harvest native plant foods (for traditional, non-commercial purposes)
- review and reissue, if appropriate, any special use permits for traditional activities such as plant collecting for basket weaving

Management Actions Considered but Eliminated from Detailed Analysis as Part of Humboldt Bay NWR Alternatives

During the public scoping period, many alternative actions for managing the Refuges were suggested. Many of these suggestions were consistent with refuge purposes and the mission of the Refuge System and influenced the action alternatives. Some of the public suggestions for refuge uses were found to be not appropriate, through an appropriate use determination, and were removed from further consideration. Others actions were found to be infeasible for the reasons described below.

Dog Walking
The public suggested that dog walking should be allowed on the Humboldt Bay NWR. This activity was found to be not appropriate because the presence of dogs is disruptive to wildlife and some dogs can also disturb other visitors engaging in wildlife-dependent activities. Therefore, dogs, both on a leash and off, are not appropriate on the Refuge.

Dog Field Training
The public suggested that the Refuge should allow hunting dog field training on the Humboldt Bay NWR. This activity was found to be not appropriate because the field training would be unnecessarily disruptive to wildlife and could not be adequately managed with available staff time and resources.

Creating a 2-3 Week Day Camp for Grades K through 12 Students
The public suggested that the Refuge should offer a 2- to 3-week summer day camp for kindergarten through 12th grade students on Humboldt Bay NWR. This activity was found to be not appropriate due to limitations on staff time and inadequate facilities to manage a 2–3 week day camp.

Camping
The public suggested that camping should be allowed on the Humboldt Bay NWR. This activity was found to be not appropriate because camping would pose an unacceptable risk to cultural resource sites and disturbance to wildlife.

Bicycling
The public suggested that the Humboldt Bay NWR should allow bicycling on walking trails and dune units. Currently, bicycling is only allowed on the entrance road, along with other forms of mechanical transportation. Bicycling was found to be not appropriate for two primary reasons. The dune units preserve fragile ecosystems and impacts from bicycles on dune unit plant communities would be severe. Bicycling on walking trails would be unnecessarily disruptive to wildlife and to other visitors engaging in wildlife-dependent activities such as wildlife observation. Bicycling will continue to be allowed on the paved entrance road at the Salmon Creek Unit and the entrance road at Ma-le'l Dunes Unit, along with other forms of mechanical transportation. Bicycling on all other parts of the Refuge was found to be not appropriate because it could disturb wildlife and other visitors.

Potential for Larger Scale Salt Marsh/Estuary Restoration
Large scale salt marsh/estuary restoration including breaching of diked areas is being done (or proposed) elsewhere at multiple places on Humboldt Bay (McDaniel Slough) and other locations on the west coast (including the Nisqually NWR near Olympia, Washington; Nestucca Bay and Bandon on the Oregon coast; and in San Francisco Bay). The Service considered potential salt marsh/estuarine restoration opportunities at Humboldt Bay NWR on a larger scale than what is included in this Draft EA, including dike breaching on the Salmon Creek Unit. However, in all of these large scale restorations in other areas, there was one common factor that does not currently exist at the Salmon Creek Unit: agency ownership of adjacent lands and/or infrastructure that would be susceptible to impacts by flooding. In addition to this key factor, the Refuge does not currently have the necessary information on hydrology, topography, and sea level rise that would inform a decision this significant. It is anticipated that this information will be being gathered relatively soon for future decision-making processes all around the bay. Therefore, larger scale salt marsh/estuary restoration was eliminated from further consideration in this EA.

Salt Marsh Restoration at Teal Island
Prior to being diked in the 1960s, Teal Island historically supported about 90 acres of salt marsh habitat. Since failure of the tidegates during the 1960s and 1970s, the earthen dikes have been deteriorating due to erosion from wave wash. There are now large sections where the former dikes are no longer present. Teal Island now has daily tidal flows; and with the exception of one 100 square-foot area of non-native salt marsh, the area formerly contained by dikes is currently all mudflat. To reestablish salt marsh vegetation on Teal Island, fill material would be required to raise the elevation of the island. Due to the cost and logistics of importing enough fill material to raise the elevation of Teal Island and projected sea level rise due to climate change, the feasibility of restoring salt marsh on Teal Island is unlikely at this time. For the aforementioned reasons, salt marsh restoration at Teal Island was not carried forward for detailed consideration in this EA. If a change in circumstances (such as availability of dredge spoil) warrants reconsideration in the future, a proposal could be evaluated at that time.

CASTLE ROCK NATIONAL WILDLIFE REFUGE

Current Management of Castle Rock NWR

Castle Rock NWR Management and Monitoring
Because Castle Rock NWR is rich with sensitive wildlife species and fragile habitat only very limited access for research, monitoring, and management can be allowed while fulfilling the purposes for which the Castle Rock NWR was established. Limited, remote observation of Castle Rock NWR has been allowed for research purposes. The Refuge collaborates with partners such as the National Oceanic and Atmospheric Administration, Humboldt State University, the California Department of Fish and Game (CDFG), and the Arcata Fish and Wildlife Office (AFWO) to conduct photo surveys of birds and marine mammals utilizing Castle Rock NWR and associated habitat. The Refuge works with partners from Humboldt State University to maintain a remote, automatic camera on Castle Rock NWR that can be viewed by the public over the internet on a seasonal basis. Interpretive panels highlighting Castle Rock NWR wildlife are located on Pebble Beach Drive in Crescent City, adjacent to the shore overlooking Castle Rock NWR.

For a complete description of the current management practices, please see "Current Management of Castle Rock NWR" in Chapter 1 of the CCP.

Table E-2. Summary of Alternatives: Castle Rock NWR

Issue Area	Alternative A (*No Action*)	Alternative B	Alternative C (*Preferred Alternative*)
Goal 1. Protect and maintain habitats for migratory birds marine mammals, with an emphasis on seabirds, and Aleutian cackling geese.			
Habitat Management	Monitor seabirds and marine mammals through aerial photo surveys and by maintaining a remote camera on island	Same as Alternative A but:	Same as Alternative A but:
	Experiment with exclusions for ACG	Same as Alternative A	N/A
	N/A	Monitoring and remote research would be only be allowed off-island	Conduct surveys every 5 years for fauna and flora including: amphibians, invertebrates, rare plants
	N/A	Evaluate options for remote monitoring of seabirds and ACG on CRNWR	Assess potential to experiment with habitat restoration by excluding ACG from key locations
Wilderness	Manage CRNWR under current designation	Do not recommend CRNWR for Wilderness designation	Recommend CRNWR for Wilderness designation and prepare required EIS

N/A = Not applicable to and not included in that Alternative; ACG=Aleutian cackling goose; CRNWR=Castle Rock NWR; EIS = Environmental Impact Statement.

Features Common to All Alternatives for Castle Rock NWR

Monitoring Seabirds and Marine Mammals

The Refuge would continue to collaborate with partners such as the National Oceanic and Atmospheric Administration, Humboldt State University, CDFG, and the AFWO to continue photographic surveys of birds and marine mammals utilizing Castle Rock NWR habitat. Surveys would continue to be conducted both aerially and by remote camera to help determine population estimates of wildlife using Castle Rock NWR habitat.

Alternative A for Castle Rock NWR: No Action

Habitat Management

Under Alternative A, Castle Rock NWR would continue to be protected from disturbance. Periodic visits to the island would continue to be conducted to maintain a remote, seabird viewing camera. Any visits to the island to maintain remote viewing equipment would occur outside of seabird and pinniped breeding seasons. Additional surveys for terrestrial plants and wildlife, beyond birds and marine mammals, would be conducted every 5 years.

Special Designation

Under Alternative A, Castle Rock NWR would continue to be designated as a National Wildlife Refuge and would not be recommended for any special designations.

Environmental Education and Interpretation

Under Alternative A, environmental education and interpretation efforts for Castle Rock NWR and its wildlife and habitat would be coordinated with that of larger State, Regional, and other California Current System seabird programs. The California Current System, which extends from Baja Mexico to British

Columbia, is a complex and extremely productive system of currents, counter currents, undercurrents and other oceanographic processes, such as upwelling, that supports millions of breeding and seasonally migrating seabirds. Over the life of the plan, partnerships might expand and the Refuge staff would continue to participate in at least one annual community event, typically the Aleutian Cackling Goose Festival.

Alternative B for Castle Rock NWR

Habitat Management

Under Alternative B, habitat management would be the same as Alternative A except that seabird and marine mammal monitoring and research would only be allowed to occur from off-island.

Special Designation

Under Alternative B, Castle Rock NWR would continue to be designated as a National Wildlife Refuge and would not be recommended for any special designations.

Environmental Education and Interpretation

Under Alternative B, environmental education and interpretation would be the same as under Alternative A. In addition, within 5 years Refuge staff would collaborate with National and State organizations to develop and provide additional outreach to students, community groups, and others and participate in an additional three community events annually. The Refuge staff would coordinate with local tribal entities, BLM, NPS, CDFG, and Del Norte County to provide interpretation of traditional uses of Castle Rock NWR.

Alternative C for Castle Rock NWR: Preferred Alternative

Habitat Management

Under Alternative C, habitat management would be the same as Alternative A except that Refuge staff and associated researchers would assess the potential to experiment with various options for seabird habitat restoration by assessing possibilities for excluding Aleutian cackling geese from certain key habitat locations.

Special Designation

Under Alternative C, Castle Rock NWR would be recommended for Wilderness designation based on the Wilderness Inventory presented in Appendix G.

Environmental Education and Interpretation

Under Alternative C, environmental education and interpretation would be the same as under Alternative A and within 3 years Refuge staff would collaborate with National and State organizations to develop and provide additional outreach to students, community groups, and others and participate in an additional two community events annually. The Refuge staff would coordinate with local Tribal entities to provide interpretation of traditional uses of Castle Rock NWR.

Proposed Action Criteria

The planning policy that implements the Improvement Act of 1997 requires the Service to select a preferred alternative that becomes its proposed action, as required by NEPA. The written description of this proposed action is effectively the draft CCP. Alternative C is the proposed action for the Refuge because it best meets the following criteria:

- achieves the mission of the National Wildlife Refuge System;
- achieves the purposes of both refuges in the Complex;
- provides guidance for achieving the each refuge's vision and 15-year goals;
- maintains and restores the ecological integrity of the habitats and populations on each of the refuges;
- addresses the important issues and challenges identified during the scoping process;
- addresses the legal mandates of the Service and the Refuge System; and
- is consistent with the scientific principles of sound fish and wildlife management and listed species recovery.

The preferred alternative was identified based on the analysis presented in the Draft CCP/EA, which may be modified following the completion of the public comment period based on comments received from other agencies, tribal governments, non-governmental organizations, or individuals.

Chapter 3. Affected Environment

Chapter 3 of the CCP provides a detailed description of the affected environment for the Humboldt Bay National Wildlife Refuge and the Castle Rock National Wildlife Refuge.

Chapter 4. Environmental Consequences

Overview of the NEPA Analysis Parameters

This chapter analyzes the direct, indirect and cumulative effects expected to occur from the implementation of each of the alternatives described in Chapter 2. The analysis is organized by each aspect of the environments described in Chapter 3, including physical, biological, social, and economic resources. The purpose of the analysis is to provide the *context* and *intensity* of the impacts of the action, such that a determination of significance can be made by the decision-makers.

The National Environmental Policy Act (NEPA) requires mitigation measures to be identified and discussed for adverse impacts to habitats, wildlife, or the human environment. While the purpose of the CCP is to develop a management plan for the refuge that maintains and improves the quality of habitat available for fish and wildlife, and improves the visitor's experience; implementation of the plan may result in temporary adverse effects to soil, water quality, or air quality. Therefore, the Service is including a number of conservation measures as an integral part of the implementation of the preferred alternative. These conservation measures will further minimize any adverse effects from implementation. For a description of the conservation measures, see Appendix 1 to the EA.

In describing the significance of impacts, the Service defers to the Council on Environmental Quality's regulations implementing NEPA at 40 CFR 1508.27.

"Significantly" as used in NEPA requires considerations of both context and intensity:

Context. This means that the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality. Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance would usually depend upon the effects in the locale rather than in the world as a whole. Both short-and long-term effects are relevant.

Intensity. This refers to the severity of impact. Responsible officials must bear in mind that more than one agency may make decisions about partial aspects of a major action.

Significance of impacts to the human environment determines whether preparation of an EIS is warranted. Thus, an EA provides a discussion of the magnitude of the impacts within the context of the situation for each impact topic.

The context of the action alternatives is the Humboldt Bay area (for Humboldt Bay NWR actions) and the adjacent coastline and waters surrounding the island of Castle Rock NWR (for Castle Rock NWR actions).

Alternative A, the No Action Alternative, is a continuation of current management practices; it serves as the baseline against which Alternatives B and C are compared. Discussion of the action alternatives (Alternatives B and C) follow each discussion of the No Action Alternative (Alternative A). Cumulative effects are discussed at the end of the section for each resource. Cumulative impacts to the environment would result when the incremental impact of an action is added to other, closely related past, present, or reasonably foreseeable future actions.

Many of the effects related to restoration of Salmon Creek are discussed and analyzed as part of the Environmental Assessment prepared for the Humboldt Bay NWR in 1992 (USFWS 1992). This document is hereby incorporated by reference. It is available for review at the Humboldt Bay NWR Complex Headquarters office. Summaries of the effects are reflected in the discussions that follow under each resource type.

HUMBOLDT BAY NATIONAL WILDLIFE REFUGE

Soils

Common to All Alternatives

Habitat Management Activities

Standard habitat management activities; including mowing, disking, tilling, prescribed fire, grazing, and irrigation; may have some effect on soils. Pesticides (including herbicides) are also used for habitat management. The effects of habitat management activities and pesticide use are discussed below.

Under all alternatives, the Refuge would continue to maintain and enhance 270 acres of agricultural grasslands (pasture) for Aleutian cackling goose habitat. Soil disturbance for maintenance activities would be expected to be temporary and localized during periodic mowing, plowing, and incorporating applications of lime to increase productivity. The amount of dust from mowing, plowing and other maintenance activities is expected to be negligible because of the high soil moisture levels at the Refuge and the Humboldt Bay vicinity, particularly in the springtime when the management activities would primarily be performed. When periodic plowing is needed, it would be done infrequently (less than 20 acres per year) and in the spring when soil moisture is high. Pastureland soils are plowed one field at a time in late April, prior to seeding. Cattle grazing may also be used to maintain cover of emergent vegetation in seasonal wetland impoundments (agricultural wetland). Grazing pressure would be surveyed periodically and cattle removed prior to compaction or erosion. Management activities that involve soil disturbance may temporarily increase erosion rates in the project area. These maintenance activities are comparable in scope to those performed on neighboring agricultural lands, but may not be conducted in the same season.

No adverse effects to soils are anticipated from fertilizers because the Refuge does not apply fertilizer to all pasturelands in any one year because the amount of fertilizer that would be effective would be cost prohibitive for these large acreages (hundreds of acres) and to avoid potentially adverse effects to water quality (effects to water quality are discussed in the section below). In accordance with recommendations by the manufacturer and the University of California Cooperative Extension (UCCE) livestock/natural resources advisor, lime is applied to pasturelands on the Refuge to balance the pH of the soil. Adding lime is done to balance soil pH and improve productivity for pasture vegetation. Since pH levels in the area are low (5.0 to 6.0), the application of lime to pasturelands is a common practice used by ranchers locally and regionally to raise soil pH. The UCCE livestock/natural resources advisor recommends the application of lime at 3.0 to 3.5 tons per acre to improve productivity of pasturelands by raising the pH; lime may be applied at this rate every 2 years (Bowers pers. comm.). The Refuge typically applies lime at this recommended rate every 3 to 5 years. The Refuge applies lime in the late summer or early fall, well in advance of the heavy rains typical for the north coast in November. The rates and frequency of lime application done by the Refuge on pasturelands is a widely accepted practice throughout the county and the State to improve vegetation productivity without any known adverse effects to soils. The effects to soils from lime application are expected to be minor, localized, and wholly beneficial to the management of agricultural grasslands.

Based on the rates, frequency, and seasonal timing of maintenance activities on the Refuge, the Service has concluded that maintenance activities that disturb the soil are expected to result in an overall beneficial effect to agricultural grassland soils in all alternatives.

Pesticides/Surfactants

Refuge maintenance activities periodically include the use of Service-approved pesticides. Service-approved pesticides would be used with all alternatives. Pesticide Use Proposals (PUP) are required for pest management activities on lands owned or managed by the Service. PUPs specify the appropriate and safe use of pesticides and require that the pesticide use is also in compliance with applicable State pesticide laws and regulations. A PUP is prepared for all pesticides use on the Refuge. This approach includes a detailed evaluation of the proposed pesticide use noting environmental hazards, efficacy, vulnerability of the target pest, and the State-issued Certified Pesticide Applicators' identification number for proposed use of any restricted use pesticides. In addition, the Refuge's use of integrated pest management strategies (selecting from mechanical, biological, cultural and chemical management methods) results in minimizing the use of pesticides and subsequently, leads to minor effects on soils.

Table E-3. Herbicides that May be Used to Control Invasive Plants on Humboldt Bay NWR

Herbicide	Active ingredient(s)	Target invasive plant	Ecotoxicology (*from manufacturer's MSDS**)
Rodeo, AquaMaster	glyphosate	harding grass, reed canary grass, bind weed, poison oak**	practically non-toxic to aquatic organisms on an acute basis
Roundup pro	glyphosate	fennel	moderately toxic to fish, slightly toxic to aquatic invertebrates, slightly toxic to green algae, practically non-toxic to: birds, arthropods, earthworms
Roundup pro concentrate	glyphosate	fennel	same as for Roundup pro
Milestone	aminopyralid	Canada thistle	not toxic to bees and non-toxic to aquatic organisms on an acute basis, practically non-toxic to birds on an acute or dietary basis
Garlon 3A	triclopyr TEA salt, triethylamine, ethanol	Himalayan blackberry	slightly toxic to aquatic organisms on an acute basis

**MSDS - A Material Safety Data Sheet (MSDS) is required under the US Dept. of Labor's Occupational Safety and Health Administration (OSHA) Hazard Communication Standard. The MSDS is a detailed informational document prepared by the manufacturer or importer of a hazardous chemical. It describes the physical and chemical properties of the product. MSDSs contain useful information such as flash point, toxicity, procedures for spills and leaks, and storage guidelines. Information included in a Material Safety Data Sheet aids in the selection of safe products*
***Poison oak is a target invasive plant where its occurrence prevents safe treatment of English ivy.*

Under all alternatives, the Refuge would continue to periodically use Service-approved aquatic herbicides including: Rodeo (glyphosate), AquaMaster and Remedy; and terrestrial herbicides such as Roundup pro (glyphosate) and Roundup pro concentrate (glyphosate), and 2, 4-D to control invasive plants on the Humboldt Bay NWR. Glyphosate, the active ingredient in Rodeo, Roundup pro, and Roundup pro concentrate is considered non-mobile in soils and sediments because it rapidly and strongly adheres to soil particles and degrades in the soil. Glyphosate is moderately persistent in the soil. Glyphosate has no known effect on soil microorganisms. Glyphosate is highly adsorbed on most soils especially those with high organic content. The compound is so strongly attracted to the soil that little is expected to leach from the applied area. Microbes are primarily responsible for the breakdown of the product. The time it takes for half of the product to break down (half-life) ranges from 1 to 174 days. Because glyphosate is so tightly bound to the soil, little is transferred by rain or irrigation water. One estimate showed less than 2 percent of the applied chemical was lost to runoff (USFS 1984). The herbicide could move when attached to soil particles in erosion run-off. In water, glyphosate is strongly adsorbed to suspended organic and mineral matter and is broken down primarily by microorganisms also. Its half-life in pond water ranges from 12 days to 10 weeks. (Cornell University1994)

Triclopyr is not strongly adsorbed to soil particles, has the potential to be mobile, and is fairly rapidly degraded by soil microorganisms. Concentrations of 500 ppm had no apparent effects on the growth of common soil microorganisms. Triclopyr was tested but not found in a host of groundwater sites throughout the country (Williams et al. 1988). The half-life of triclopyr in soil is from 30 to 90 days, depending on soil type and environmental conditions, with an average of about 46 days. The half-life of one of the breakdown products (trichloro-pyridinol) in 15 soil types (similar to those at the Refuge) ranged from 8-279 days with 12 of the tested soils having half-lives of less than 90 days. Longer half-lives occur in cold or arid conditions.

The World Health Organization (1984) concluded that 2, 4-D does not accumulate or persist in the environment. The primary degradation mechanism is microbial metabolism, but mineralization and possibly photolysis may also play a role. The average half-life of 2, 4-D is 10 days (Tu et al. 2001).

Based on the above information and the Service's PUP requirements, the Service has concluded that the use of these PUP-regulated herbicides would result in no adverse effects to soils and soil microorganisms on and near the Refuge for all alternatives.

Alternative A: No Action

Factors that could affect soils, including maintenance activities, pesticide use, soil compaction and soil erosion are not expected to change with Alternative A. Since 1971, when the Refuge was established, the pasturelands have remained productive and supported cattle and wildlife. Based on the analysis in the section Common to All Alternatives and above, the Service has concluded that no changes to soils and no adverse effects are anticipated with Alternative A, the continuation of current management and restoration activities.

Alternative B

As part of Alternative B, the Refuge would excavate and restore approximately 1,500 linear feet of Salmon Creek into a meandering channel. The volume of excavated soil is estimated at 10,000 cubic yards. These restoration activities are expected to have generally localized effects. Alternative B also proposes to raise 35 acres of the White Slough Unit and 90 acres of Salmon Creek overflow marsh plain (a total of 125 acres). The soil excavated from the meandering channel would be used to raise the marsh plain, so no imported soil is needed. The effects of action Alternative B on soils are expected to be localized within the 125 acres of the salt marsh habitat as described below.

The first step in the salt marsh restoration process would be to remove approximately 12 inches of exiting topsoil and native marsh plants for storage on the Refuge. After the topsoil and plants have been salvaged, clean fill soil would be spread on the marsh plain to raise the elevation. After the fill soil is placed, the salvaged and stockpiled native topsoil would be spread on top of the fill material. The heavy (earth moving) equipment that is used to place fill and replace topsoil is expected to cause some temporary and localized soil compaction. Alternative B also proposes either conversion of the existing barn near the Visitor Center or new construction of a covered outdoor structure for environmental education activities. Soils that will be directly beneath the foundation of a new structure (a foot-print of approximately 1,000 square feet) are required to be compacted for stability of the structure.

For construction activities related to the Salmon Creek restoration, salt marsh restoration, and the environmental education structure, conservation measures would be required as part of the construction contracts to minimize the extent and severity of soil compaction and erosion. Earth moving activities could result in large areas of bare soil that could be subject to erosion during the rainy season (November through April); however, the requirement of conservation measures is expected to minimize soil erosion. Excavation of 1,500 linear feet of creek, restoration of 125 acres of salt marsh, or construction of the environmental education facility each could be completed within 1 construction season (the drier months of 1 calendar year); 1 year of construction activities within the 15-year period of analysis ("life of the CCP") or relatively short-term. Erosion due to flowing water is expected to be short-term, minor and localized because earth moving would occur primarily during months with less precipitation, the terrain is relatively flat, and the Refuge would employ conservation measures to minimize soil erosion. For a description of conservation measures, refer to Appendix 1 to this EA.

Because conservation measures would be employed to mitigate soil erosion and compaction due to maintenance activities, Salmon Creek restoration activities, and construction (or conversion) of an education building and raising Salmon Creek overflow marsh plain, any adverse effects to soils are expected to be temporary and localized. Based on the climatic conditions at the Refuge and use of conservation measures to mitigate any potential adverse effects to soils, the Service has concluded that adverse effects to soils are anticipated to be greater than Alternative A (the no action alternative), but minimal with Alternative B.

Alternative C: Preferred Alternative

The effects of Alternative C to soils are expected to be similar to those described under Alternative B except that an additional 500 linear feet of creek profile would be excavated to connect the new meandering Salmon Creek channel to salmonid rearing habitat (Cattail Creek) and 110 acres more are being restored to salt marsh habitat (as compared to Alternative B). The volume of excavated soil is estimated at 2,000 cubic yards, which would be used to raise the salt marsh plain. These restoration activities are expected to have generally localized effects. The effects of Alternative C on soils are expected to be localized on portions the

total of 235 acres of salt marsh on the Refuge. Only portions of the salt marsh restoration would be restored at any one time; not all 235 acres would be restored at once. Excavation of the additional 500 linear feet and restoration of an additional 110 acres of salt marsh for Alternative C may take an additional construction season (a total of 2 calendar years, but construction activities would not be done in wet weather in the winter); 2 years of construction activities within the 15-year period of analysis or relatively short-term. As with Alternative B, conservation measures would be required and employed throughout restoration and construction activities. The Service has concluded that although more acreage is being restored in Alternative C, because conservation measures would be employed to mitigate soil erosion and compaction, any adverse effects to soils are expected to be temporary and localized. Based on the climatic conditions at the Refuge and use of conservation measures to mitigate any potential adverse effects to soils, the Service has concluded that adverse effects to soils are anticipated to be to be minimal under Alternative C but greater than Alternative A (the no action alternative) or Alternative B.

Cumulative Effects

Refuge management activities including mowing, disking, tilling, prescribed fire, grazing, herbicide/pesticide treatments, and irrigation are done once or twice a year on applicable units. Restoration activities and the potential for associated soil compaction and soil erosion would occur sporadically during the 15-year period of analysis and only on applicable units Based on this, the Service has concluded that the incremental contribution of Refuge maintenance activities and restoration activities (from any alternative) to the regional cumulative impact on soils would be less than cumulatively considerable.

Water Quality

Common to All Alternatives

Many bodies of water are located on the Refuge including freshwater and brackish marshes, flooded pasturelands, sloughs, creeks, ponds (small impoundments of water), and the Humboldt Bay. All of these water bodies or drainages provide multiple benefits to fish and wildlife (see the Fish and Wildlife section below for a discussion of benefits). The quality of the Refuge's and adjacent water resources is of foremost importance to the Refuge to uphold the Service's conservation mission and the purposes for which the Refuge was established (see Chapter 1).

Habitat Management Activities

Standard habitat management activities; including mowing, disking, tilling, prescribed fire, grazing, and irrigation; are not expected to adversely affect water quality. Pesticides (including herbicides) are also used for habitat management. The effects of habitat management activities and pesticide (and their surfactants) use on water quality are discussed below.

Under all alternatives, the Refuge would continue to maintain and enhance 300 acres of agricultural grasslands (pasture) for Aleutian cackling goose habitat. Periodic plowing would be done infrequently (less than 20 acres per year). Pastureland soils are plowed one field at a time in late April, prior to seeding. Plowing is done in the spring when soil moisture is high and after the severe storm season, which reduces the potential for runoff and erosion of newly plowed soils. Therefore, the Service anticipates that there would be minimal soil erosion resulting from maintenance activities; and that would be temporary, and localized during periodic mowing and plowing. Cattle grazing may also be used to maintain cover of emergent vegetation in seasonal wetland impoundments (agricultural wetland). Grazing allotments would be surveyed periodically and grazing animals removed prior degradation of resources including erosion or degradation of drainages. Grazing is and will continue to be excluded from areas where grazing may adversely affect water quality. Riparian areas, ephemeral streams, and seeps, and habitat for rare and protected species would not be grazed.

Refuge staff removes dense-flowered cordgrass from the salt marsh as part of their invasive plant species management activities. After Refuge staff removes (uproots) the dense-flowered cordgrass from the salt marsh, the uprooted or dead plant material (biomass) is raked into piles and burned. Dense-flowered cordgrass is removed from about 50 acres at a time. While biomass piles and removal is concentrated in areas away from stream channels, these management actions can cause short-term turbidity in localized areas on the salt marsh plain. Associated turbidity is expected to dissipate without adversely affecting the water quality on the Refuge or adjacent lands. Effects to air quality and fish and wildlife are discussed in those sections, below.

Habitat management activities may also involve large earthmoving equipment that could result in the introduction of various contaminants, such as fuel oils, grease, and other petroleum products, either from direct contact between the equipment and the water or through surface runoff. Effects of contaminants on soils are discussed in that section above, and effects on fish or wildlife are discussed in the section on Fish and Wildlife, below. The Refuge has established spill-prevention and countermeasure plans to protect water from contaminants. These plans include on-site handling criteria to avoid introducing contaminants into waterways. Staging, washing, and storage areas for equipment, construction materials, fuels, lubricants, solvents, and other possible contaminants are provided away from waterways. These criteria are a part of the conservation measures for protection of water quality. Conservation measures would be employed to avoid and minimize any potentially adverse effects to water quality on the Refuge and in adjacent waters. (See Appendix 1 to the EA for a description of conservation measures.)

These conservation measures apply to pesticides (including herbicides and surfactants). Under all alternatives, for habitat maintenance in aquatic environments, the Refuge would continue to use Service-approved aquatic herbicides including: Rodeo (glyphosate), AquaMaster, and Remedy periodically to control invasive plants on the Humboldt Bay NWR. In most cases, glyphosate will dissipate rapidly from natural water bodies through adsorption to the organic substances and inorganic clays, degradation and dilution (Folmar et al. 1979, Feng et al. 1990). See also the discussion of these herbicides in the Soils, Common to All Alternatives section within this chapter.

With the implementation of measures to avoid contaminating water (the conservation measures), no adverse effects to water quality from the use of aquatic herbicides, other habitat management and restoration activities, or from compatible uses are anticipated with any of the alternatives.

Alternative A: No Action

Factors that could affect water quality, such as rainfall runoff and recreational use, are not expected to change. The Service expects no adverse effects to the beneficial uses of water bodies on the Refuge. The Service has concluded that no changes to water quality are anticipated and no adverse effects to water quality would result with Alternative A, the continuation of current management practices.

Alternative B

Restoration of approximately 1,500 linear feet of Salmon Creek Restoration activities could result in temporary, short-term adverse effects to water quality due to the potential for increased turbidity from erosion, sedimentation, and the potential for incidental introduction of contaminants from earth-moving or other construction equipment. These potential effects would be minimized through conservation measures (see Appendix 1 of this EA). After restoration, with a fully functioning estuarine ecosystem, the Service expects a long-term beneficial effect of improved water quality to result from the proposed habitat restoration. The Service expects improvement and no adverse effects to water quality on and off of the Refuge.

Alternative B proposes the addition of a launch area at the Ma-le'l Dunes Unit for non-motorized boats and associated signage to inform the public about water quality requirements. The Service has noted that since water quality sampling was begun by the oyster growers in the mid-1970s, there has been increasing use of the Mad River Slough area (as well as the rest of the bay) by non-motorized boaters with no corresponding increase in required oyster harvest closures by CDPH; by inference, no decrease in water quality. Further, while the Ma-le'l dunes area was receiving substantially increased public use (when it was formerly open to the public during the period from 1990 to 1994) again, there was no increase in harvest closures. During that time of increased use from 1990 to 1994, there was an above-ground composting toilet in place. Adding a non-motorized boat launch may increase public use of the slough, but the amount of use a new non-motorized boat launch would receive is speculative at this time.

With implementation of the conservation measures, and compliance with the Clean Water Act, the Service has concluded that no adverse effects to water quality would result with Alternative B.

Alternative C: Preferred Alternative

Restoration of approximately 500 linear feet of Salmon Creek could result in temporary, short-term adverse effects to water quality due to the potential for increased turbidity due to erosion, sedimentation, and introduction of contaminants from equipment. As discussed in the Soils section above, these potential

effects would be minimized through using conservation measures (see Appendix 1) during construction. The Service expects that long-term beneficial effects of improved water quality would result from habitat restoration. The Refuge will continue consultations with CDPH, HBHRCD, and the oyster growers regarding water quality.

With implementation of the conservation measures, and compliance with the Clean Water Act, the Service has concluded that no adverse effects to water quality would result with Alternative C.

Cumulative Effects

With conservation measures, no adverse effects to water quality are expected with any of the alternatives. After completion of restoration projects and several years for plant growth, restoration is expected to have a beneficial effect on water quality. Based on the above analysis, the Service has concluded that the incremental contribution from any alternative to the regional cumulative impact on water quality would be beneficial, but less than cumulatively considerable.

Air Quality

Common to All Alternatives

All alternatives include maintaining or restoring agricultural grasslands (pasture land). Maintenance or management activities include periodically disking, mowing, plowing, dike repair, related vehicular traffic, and/or cattle grazing agricultural grasslands. The North Coast Unified Air Quality Management District (NCUAQMD) does not require permits for maintenance activities such as these or new construction. Soil disturbance from maintenance activities may result in temporary, short-term increases in fugitive dust (particulate matter less than 10 microns [PM10]) and tailpipe emissions of PM10 and nitrogen oxides (NOx) from the maintenance equipment.

The amount of dust from mowing, plowing and other maintenance activities is expected to continue to be negligible because of the high soil moisture levels at the Refuge and the Humboldt Bay vicinity, particularly in the springtime when the management activities would primarily be performed. When periodic plowing is needed, it would be done infrequently (less than 10 acres per year) and in the spring when soil moisture is high. Agricultural grassland or pastureland soils are plowed one field at a time in late April, prior to seeding. Therefore, fugitive dust from maintenance activities is expected to be low. Emissions from the maintenance equipment is expected to have a negligible effect on air quality because the equipment would be operated primarily during the spring, a time of year when the North Coast is in attainment of the EPA standards for these pollutants.

Periodic controlled burning is occasionally used by the Refuge for vegetation management and/or burning of brush piles. For example, Refuge staff removes dense-flowered cordgrass from the salt marsh as part of their invasive plant species management activities. After the dense-flowered cordgrass is removed (uprooted from the mud or singed in place with backpack torches), the uprooted or dead plant material (biomass) is raked into piles and burned. Dense-flowered cordgrass is removed from about 50 acres at a time. Brushpiles also result from eucalyptus control. When periodic controlled burning is needed, the Refuge coordinates with NCUAQMD, which monitors PM10 and other pollutant levels, and regulates prescriptive burning. Prescriptive burning directly affects PM10 levels. The NCUAQMD allows prescriptive burns on the Refuge and elsewhere on the north coast when conditions and PM10 levels permit. Any potentially adverse effects to air quality from controlled burning of vegetation are mitigated through the timing and other requirements of the approved burn plans coordinated with the NCUAQMD. The increase in emissions at the Refuge associated with maintenance activities would be negligible in comparison to the emissions from the adjacent Highway 101. Based on the above analysis, the Service has concluded that no adverse effects to air quality are anticipated from maintaining or restoring agricultural grasslands in any of the alternatives.

Alternative A: No Action

Factors that could affect air quality, such as disking, mowing, dike repair, and traffic would not change. The effects of these are discussed above. Based on the above, the Service has concluded that no changes to air quality are anticipated and effects to air quality are expected to be negligible with Alternative A, the continuation of current management actions.

Alternative B

Alternative B may result in localized and temporary effects to air quality from heavy equipment operation during re-alignment of 1,500 linear feet of creek channel as part of the Salmon Creek Restoration project. Equipment could include a wheeled scraper (wheeled), a bulldozer or excavator (tracked) or other type of excavator, 1 or 2 dump trucks and workers' vehicles. As part of raising the elevation of the salt marsh plain, placing fill and replacing topsoil is expected to result in temporary and localized increase in fugitive dust. The same types of earth moving equipment could be used to place the fill soil. Fugitive dust is expected during the use of heavy equipment, but it is expected to be minimal due to the high soil moisture on the Refuge. Although the work must be done when the soil is dry enough to use the equipment effectively, construction would be done in the spring when the area is still in attainment with air quality requirements. Restoration work is expected to take 1 construction season (the drier months).

Alternative B includes construction of a covered outdoor structure large enough for up to 30 people (up to 1,000 square feet in area) for environmental education or conversion of the existing barn to accommodate this use. Also, Alternative B includes modifying 0.25-mile of trails to wheelchair accessible trails. Tailpipe emissions from construction equipment and worker trips to and from the job site could be expected to increase temporarily during construction. The increase would be temporary and localized and primarily during the spring when the area is in attainment.

If a new or remodeled environmental education structure or more accessible trails result in an increase in the number of visitors, it would not necessarily result in more vehicle trips. Under Alternative B, the Refuge expects to increase visitor opportunities by 10,000 opportunities per year more than Alternative A (currently). Although more visitor opportunities are provided to the public, it is difficult to estimate how many more visitor trips will result from more opportunities being available. It is reasonable to assume that an increase in visitor use at the Refuge may reflect visitors' choosing the Refuge as their destination rather than another location offering similar opportunities in the Humboldt Bay area. Therefore, an increase in visitor use at the Refuge may not result in more vehicle trips in the area or in an increase in tailpipe emissions on and near the Refuge. If there is an increase in tailpipe emissions associated with an increase in visitors, it would be negligible. Based on the above analysis, the Service has concluded that this minimal increase in emissions at the Refuge associated with more vehicle trips by construction equipment or visitors is not expected to adversely affect the Refuge resources or the ambient air quality.

The NCUAQMD does not require permits for maintenance activities or new construction. However, NCUAQMD does require permitting for remodeling, demolishing or renovating structures. If the Service determines that the existing barn will be renovated to accommodate the proposed environmental education facility or that other existing structures on Salmon Creek and Lanphere Dunes, a permit from the NCUAQMD and further analysis would be required to determine if contaminants are present and evaluate the environmental effects of renovating the barn.

Alternative C: Preferred Alternative

Alternative C includes restoration of approximately 10 acres of agricultural grasslands (pasturelands) to riparian swamp (3 acres) or salt marsh (7 acres of 45 acres total). Riparian swamp or salt marsh would require less (if any) maintenance activities than pastureland. A decrease in these activities is expected to result in a decrease in fugitive dust. Therefore, the Service expects that there would be a slight decrease in PM10 in the vicinity of the White Slough Unit.

Alternative C may result in localized and temporary effects to air quality from heavy equipment operation during re-alignment of 1,500 linear feet of creek channel plus excavation of an additional 500 linear feet of creek channel connecting the newly re-aligned channel to Cattail Creek as part of the Salmon Creek Restoration project. As with Alternative B, equipment could include a wheeled scraper (wheeled), a bulldozer or excavator (tracked) or other type of excavator, 1 or 2 dump trucks and workers' vehicles. As part of raising the elevation of the salt marsh plain, placing fill and replacing topsoil is expected to result in temporary and localized increase in fugitive dust. The same types of earth moving equipment could be used to place fill. Fugitive dust is expected during the use of heavy equipment, but it is expected to be minimal due to the high soil moisture on the Refuge. Although the work must be done when the soil is dry enough to use the equipment effectively, construction would be done in the spring when the area is still in attainment with air quality requirements. No more equipment would be needed, but with the additional 500 linear feet

of excavation, Alternative C is expected to take a total of 2 construction seasons (work would occur during the drier months and not during the winter when soils are too wet for the equipment to work).

Alternative C includes construction of a covered outdoor structure large enough for up to 30 people (up to 1,000 square feet in area) for environmental education or conversion of the existing barn to accommodate this use. Also, Alternative C includes an increase in wheelchair accessible trails (0.50-mile more than Alternative A and 0.25-mile more than Alternative B). If more accessible trails result in an increase in the number of visitors, it would not necessarily result in more vehicle trips. Under Alternative B, the Refuge expects to increase visitor opportunities by 15,000 opportunities per year more than Alternative A (currently). Although more visitor opportunities are provided to the public, it is difficult to estimate how many more visitor trips will result from more opportunities being available. It is reasonable to assume that an increase in visitor use at the Refuge may reflect visitors' choosing the Refuge as their destination rather than another location offering similar opportunities in the Humboldt Bay area. Therefore, an increase in visitor use at the Refuge may not result in more vehicle trips in the area or in an increase in tailpipe emissions on and near the Refuge. If there is an increase in tailpipe emissions associated with an increase in visitors, it would be negligible. Based on the above analysis, the Service has concluded that this minimal increase in emissions at the Refuge associated with more vehicle trips by construction equipment or visitors is not expected to adversely affect the Refuge resources or the ambient air quality.

The NCUAQMD does not require permits for maintenance activities or new construction. However, NCUAQMD does require permitting for remodeling, demolishing or renovating structures. If the Service determines that the existing barn will be renovated to accommodate the proposed environmental education facility or that other existing structures on Salmon Creek and Lanphere Dunes, a permit from the NCUAQMD and further analysis would be required to determine if contaminants are present and evaluate the environmental effects of renovating the barn.

Based on the above analysis, the Service has concluded that this minimal increase in emissions at the Refuge associated with more vehicle trips by construction equipment or visitors is not expected to adversely affect the Refuge resources or the ambient air quality.

Cumulative Effects

Based on the above analysis, the Service has concluded that the incremental contribution of habitat maintenance activities, construction of the features of the Salmon Creek Delta Restoration or the environmental education structure and any increase in visitors (from any alternative) to the regional cumulative impact on air quality would be less than cumulatively considerable.

Plant Communities

Common to All Alternatives

Disking, mowing, chemical treatments, and cattle grazing would be used periodically to maintain cover of emergent vegetation in seasonal wetland impoundments (also known as agricultural wetland). The Refuge would continue to use mechanical and chemical methods to control undesirable invasive plant species such as dense-flowered cordgrass (*Spartina densiflora*). The Refuge would continue to mow and graze grassland habitat to provide short-grass pasture for use by Aleutian cackling geese and other species.

Alternative A: No Action

After Refuge staff removes dense-flowered cordgrass from the salt marsh through manual (digging) and mechanical (mowing, flaming) methods, the areas would then be re-vegetated with native species including salt grass (*Distichlis spicata*), pickleweed (*Salicornia virginica*), and minor jaumea (*Jaumea carnosa*). Non-native cordgrass can have many negative effects on Humboldt Bay NWR habitats and associated species including: competing with and displacing native salt marsh plant communities; converting intertidal mudflat to non-native salt marsh; decreasing shorebird foraging habitat; and filling in channels and altering marsh hydrology. Therefore, re-vegetating the salt marsh with native species is expected to allow native salt marsh plant communities to recover; decrease the loss of mudflat; increase shorebird foraging habitat; and allow channels to remain clear of vegetation and functional for longer periods of time. Although on-going invasive plant species management activities are expected to continue to improve the habitat quality or value of the plant communities on the Refuge, reducing or eliminating invasive plants would not convert

the plant community to another type of community. The Service has concluded that there would be no changes to the total acreages of existing plant communities and no adverse effects would be anticipated with Alternative A, the no action alternative.

Alternative B

Salmon Creek Delta Restoration

Alternative B also includes planting riparian vegetation on the sides of the new 1,500 linear-foot channel to a minimum width of 100 feet (150,000 square feet or 3.4 acres). These plantings of riparian vegetation would convert 3.4 acres of primarily non-native short-grass pasture to riparian habitat (increasing the total acreage of riparian swamp on Refuge lands by 3.4 acres and decreasing the acreage of short-grass pasture commensurately). This additional riparian habitat would offset any that might be lost due to increased tidal influence in lower Salmon Creek.

Salt Marsh Habitat

Restoration activities on Salmon Creek Unit would convert mudflat to salt marsh habitat, as it was historically. The restoration of 125 acres of mudflat to salt marsh would increase the total acreage of salt marsh on Refuge lands from 313 acres to 438 acres (a 40 percent increase) Salt marsh contributes invaluable nutrients to the estuarine ecosystem; provides valuable habitat for fish and wildlife; filters out pollutants; and buffers adjacent lands from flood tides and storms. Salt marshes provide habitat for fish, invertebrates, many shorebirds, and some waterbirds. In addition, salt marshes likely provide habitat for the endangered tidewater goby; several species of threatened salmonids; and eulachon, a CDFG California Species of Special Concern. Because of extensive diking, the Humboldt Bay estuary has sustained significant losses of salt marsh, primary productivity, and natural hydrology resulting in changes to sedimentation, deposition, currents, habitat for estuarine plant and animal species, and water quality. Restoring mudflat to historic salt marsh is considered beneficial to the Refuge and to the region because salt marsh is a threatened habitat type in Humboldt Bay and throughout the United States. The Service expects that by increasing and improving the salt marsh plant community on the Refuge, it would result in the long-term, local and regional beneficial effects described above.

Freshwater and Brackish Marsh (FBM)

Alternative B includes restoring 130 acres of FBM to short-grass pasture to improve Aleutian cackling goose habitat (increasing the total acreage of short-grass pasture on Refuge lands by 130 acres and decreasing the acreage of FBM commensurately). Allowing cattle grazing on the central portion of the Hookton Slough Unit will promote the growth of short-grass pasture. Providing more short-grass pasture on the Refuge is expected to increase the intensity of Aleutian cackling goose use on the Refuge and reduce the intensity of goose use on the adjacent private pasturelands. Units managed by the Refuge as short-grass pasture are still considered and managed as seasonal freshwater marsh, supporting other species in addition to Aleutian cackling goose. Therefore, although the species composition of the pastureland or marsh may change slightly to favor short-grass species, the freshwater marsh plant community or any other plant community would not change. The Service expects that by increasing and improving short-grass species in the FBM plant communities on the Refuge, it would result in the long-term, local and regional beneficial effects described above.

Riparian Swamp Habitat

Alternative B includes replacing 20 acres of non-native trees with riparian swamp species over the course of 5 years. The restoration of 20 acres of non-native trees to riparian swamp would increase the total acreage of riparian swamp habitat on Refuge lands from 105 acres to 125 acres.

Riparian habitat is very rare now compared to what existed historically in the Humboldt Bay area. This diverse vegetative community provides valuable travel corridors for wildlife and habitat supporting biological integrity and environmental health on the Refuge. Riparian forests provide rich habitat for a wide variety of plant species, mammals, reptiles, amphibians, and especially migrating and nesting songbirds, and improve conditions for fish by contributing nutrients, shade, and cover to streams. Therefore, the Service expects that by increasing and improving the riparian swamp plant community on the Refuge, it would result in long-term, local and regional beneficial effects described above.

Dune Habitats (including dune mat/foredune grassland, dune swale, dune riparian/swamp, and coniferous dune forest)
Alternative B includes various restoration and enhancement activities on the dune habitats at Humboldt Bay NWR. The Refuge includes over 400 acres of dune habitats.

The dune mat habitat on the Humboldt Bay NWR is some of the most pristine habitat of its type on the west coast of the United States, containing native plant communities that are globally declining. Foredune plant communities are globally rare and the Lanphere Dunes represent some of the most pristine dunes left in the United States. As with other rare dune habitats, pristine dune swales are rare on the west coast of the United States, occurring only north of the central coast in California (Pickart and Barbour 2007). Given the rarity of dune swale habitat and its value to wildlife, restoration of native plant species is necessary for the maintenance of the biological integrity, diversity, and environmental health of the dune ecosystem as well as to protect many California Species of Special Concern.

Coniferous dune forest is also a globally declining habitat type. It supports many of Humboldt Bay NWR's mammal species, including the rare white-footed vole, a CDFG California Species of Special Concern (CDFG 2007). Several CDFG California Bird Species of Special Concern also use coniferous dune forest habitat including Cooper's hawk, yellow warbler, osprey, and black-capped chickadee. Coniferous dune forest provides habitat for several species of amphibians and reptiles. Many plant species such as sugar stick (*Allotropa virgata*), spotted coral-root (*Corallorhiza maculata*), calypso orchid (*Calypso bulbosa*), and twayblade (*Listera cordata*), are uncommon close to the coast, and have been found only in a few locations in the coniferous dune forest habitat. Maintaining and restoring healthy native plant communities in the coniferous dune forest contributes greatly to the overall biological integrity, diversity, and environmental health of the refuge and surrounding area.

Based on the uniqueness and rarity of dune habitats, the Service expects that restoration of dune habitats would result in long-term, local, regional, and globally beneficial effects. There would be no change in acreage of dune plant communities as a result of Alternative B.

Based on the above analysis, the Service has concluded that there would be beneficial changes to the plant communities at the Humboldt Bay NWR and no adverse effects would be anticipated with Alternative B.

Alternative C: Preferred Alternative

Salmon Creek Delta Restoration
Alternative C includes the same Salmon Creek Restoration activities as Alternative B. The effects to plant communities from the Salmon Creek Delta Restoration are the same as described in Alternative B; planting riparian vegetation on the sides of the new 1,500 linear-foot channel to a minimum width of 100 feet (150,000 square feet or 3.4 acres). These plantings of riparian vegetation would convert 3.4 acres of primarily non-native short-grass pasture to riparian habitat (increasing the total acreage of riparian swamp on Refuge lands by 3.4 acres and decreasing the acreage of short-grass pasture commensurately).

Alternative C also includes an additional 500 linear feet of creek profile would be excavated to connect the new meandering Salmon Creek channel to salmonid rearing habitat (Cattail Creek).
Alternative C does not include plantings of riparian vegetation along the 500 linear feet; however, the Service expects that recruitment of riparian species would occur along the new creek profile. The Service expects that this would result in the conversion of some non-native short-grass pasture to riparian habitat; slightly increasing the total acreage of riparian swamp on Refuge lands by a negligible acreage and decreasing the acreage of short-grass pasture commensurately. Although the actual surface area of such recruitment may be small in acreage, the Service expects that the increase in riparian habitat would be beneficial to the species dependent on riparian habitat (see Appendix K).

Salt Marsh Habitat
Alternative C includes restoring an additional 38 acres of salt marsh on Hookton Slough Unit, 60 acres on Table Bluff Unit, and 45 acres on White Slough Unit. Increasing salt marsh habitat would be expected to further increase invaluable nutrients to the estuarine ecosystem; provide valuable habitat for fish and wildlife; filter out pollutants; and buffer adjacent lands from flood tides and storms. Alternative B provides 143 acres more of salt marsh restoration than Alternative B. The additional acres of salt marsh restoration

with Alternative C would increase salt marsh habitat for fish, invertebrates, many shorebirds, and some waterbirds. In addition, it may provide habitat for the endangered tidewater goby; several species of threatened salmonids; and eulachon, a CDFG California Species of Special Concern. Because of extensive diking, the Humboldt Bay estuary has sustained significant losses of salt marsh, primary productivity, and natural hydrology resulting in changes to sedimentation, deposition, currents, habitat for estuarine plant and animal species, and water quality. Restoring mudflat to historic salt marsh is considered beneficial to the Refuge and to the region because salt marsh is a threatened habitat type in Humboldt Bay and throughout the United States. Therefore, the Service expects that by increasing and improving the salt marsh plant community on the Refuge, it would result in the long-term, local and regional beneficial effects.

Additional restoration activities on White Slough, Hookton Slough, and Table Bluff Unit overflow would convert an additional 110 acres of mudflat to salt marsh habitat (a total of 235 acres). The restoration of 235 acres of mudflat to salt marsh would increase the total acreage of salt marsh on Refuge lands from 313 acres to 548 acres (75 percent more salt marsh). With Alternative C, more than 60 acres of mudflat on Salmon Creek Overflow would be raised to restore the tidal prism and create additional salt marsh. This is expected to provide additional beneficial effects (relative to Alternative B) by improving water quality and increasing salt marsh habitat.

Based on the analysis presented under Alternative B and above, the Service has concluded that there would be beneficial changes to the plant communities at the Humboldt Bay NWR and no adverse effects would be anticipated with Alternative C.

Freshwater and Brackish Marsh
Alternative C includes construction of a low contour dike that allows muted tidal exchange north of the dike (see Figure E-3).

Riparian Swamp Habitat
The effects of Alternative C on riparian swamp habitat would be the same as under Alternative B, except 3 acres of short-grass pasture habitat would be restored to riparian swamp habitat. As in Alternative B, Alternative C includes replacing 20 acres of non-native trees with riparian swamp species over the course of 5 years.

Riparian habitat is very rare now compared to what existed historically in the Humboldt Bay area. This diverse vegetative community provides valuable travel corridors for wildlife and habitat supporting biological integrity and environmental health on the Refuge. Riparian forests provide rich habitat for a wide variety of plant species, mammals, reptiles, amphibians, and especially migrating and nesting songbirds, and improve conditions for fish by contributing nutrients, shade, and cover to streams. Therefore, the Service expects that by increasing and improving the riparian swamp plant community on the Refuge, it would result in long-term, local and regional beneficial effects described above.

Dune Habitats (including dune mat/foredune grassland, dune swale, dune riparian/swamp, and coniferous dune forest)
The effects of Alternative C on dune habitats would be the same as under Alternative B except for: dune swale, dune riparian/swamp, and coniferous dune forest, the restoration the effects would be expected to occur 5 years earlier because the actions would be implemented 5 years earlier.

Based on the above analysis, the Service has concluded that there would be beneficial changes to the plant communities at the Humboldt Bay NWR and no adverse effects would be anticipated with Alternative C.

Cumulative Effects

The Service has concluded that incremental contribution of Alternative C to the regional cumulative impact on plant communities would be less than cumulatively considerable except for the dune mat/foredune grasslands and dune riparian swamp habitat. Pristine examples of the dune plant communities are rare on the west coast of North America. Therefore, the cumulative impacts of proposed restoration and enhancement actions on dune mat/foredune grassland and dune riparian swamp plant communities are expected to be cumulatively beneficial to plant communities.

Fish and Wildlife

Common to All Alternatives

Existing habitats will be either maintained or restored. Some management activities will lead to a habitat changing from one type to another, which in general will result in gains to some habitats and species and losses for others. Any disturbance to wildlife species due to restoration is likely to be temporary while these activities occur. Motile species are expected to move away from areas being disturbed, and they or their progeny are likely to return to the site when restoration activity ceases. While a small number of individual animals may be harmed through refuge operations such as restoration activities, in general, fish and wildlife populations are expected to benefit from actions taken by Refuge staff because that is the purpose and goal of these activities. The effects of hunting on wildlife are also discussed within this section, below.

The invasive non-native dense-flowered cordgrass can have many adverse effects on Humboldt Bay NWR habitats and their associated wildlife species including decreasing shorebird foraging habitat. Strategies for managing and reducing invasive species are analyzed in more detail above in the Plant Communities section. Removal of invasive species and re-vegetating salt marsh with native species is expected to allow native salt marsh plant communities to recover, increase shorebird foraging habitat and decrease the need for clearing vegetation from the channels. After Refuge staff removes (uproots) the dense-flowered cordgrass from the salt marsh, the uprooted or dead plant material (biomass) is raked into piles and burned. Dense-flowered cordgrass is removed from about 50 acres at a time. These management actions can cause short-term turbidity in localized areas. These actions and any associated turbidity would not occur in fish spawning areas. Effects to water and air quality are discussed in those sections, above. Because invasive species management activities are done to improve habitat values on the Refuge, the Service has concluded that invasive species management would have beneficial effects on fish and wildlife.

Guided by this goal and the expertise of the Refuge staff, and the technical expertise of the Service's Arcata Fish and Wildlife Office and the National Marine Fisheries Service, the Service has concluded that the long-term effects of any of the management alternative on fish and wildlife are expected to be generally beneficial for native species using the refuge. Effects on species protected by the Federal and State Endangered Species Acts are discussed in the Special Status Species section, below.

Salmon Creek Delta Restoration

This restoration project would fulfill goals set forth in the 1989 Humboldt Bay National Wildlife Refuge Management Plan. The Salmon Creek Unit consists of about 1,350 acres and the proposed restoration area encompasses approximately 197 acres of diked freshwater and muted tidal wetland habitats. The Refuge will continue to adaptively manage the implementation of Phase I of the Salmon Creek Restoration project. NEPA compliance was completed for Phase I of the Salmon Creek Restoration project in a separate NEPA document (USFWS 1992). Phase I is expected to benefit fish and other estuarine dependent species, some passerine birds, and some species of other wildlife and plants. A riparian component is included in the restoration plan.

Adaptive management of this restoration project is coordinated with the Arcata Fish and Wildlife office's Ecological Services program and the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA Fisheries). Adaptive management may include augmentation of tide gate function to maximize anadromous fish passage and placement of large woody debris in channels. Adaptive management would be informed by monitoring species' use of habitats, any changes in channel cross-sections, changes in sediment transport, and changes in water quality.

Salmon Creek historically had large runs of Coho salmon (*Oncorhynchus kisutch*) and anadromous steelhead (*O. mykiss*). In addition, Chinook salmon (*O. tshawytscha*) and coastal cutthroat (*O. clarki clarki*) trout were historically found throughout the watershed. Although the stream continues to support populations of all four native anadromous salmonid species, their populations are believed to have dramatically declined over the past 150 years due to human-caused changes throughout the watershed. Coastal populations of Chinook, Coho, and steelhead are Federally listed as threatened species. In addition, the Hookton Slough area is habitat for the Federally threatened tidewater goby (*Eucyclogobius newberryi*). Mammals associated with the area include river otter, black-tailed deer, grey fox, striped skunk, and raccoon. Other small rodents and mammals are associated with this area of the Refuge as well.

The marsh habitats of the Refuge are used by geese, ducks, other waterbirds such as herons and egrets, and shorebirds, such as marbled godwits and willets. Amphibians that occur in the local area include the rough-skinned newt (*Taricha granulose*), pacific tree frog (*Hyla regilla*), and northern red-legged frog (*Rana aurora aurora*). These amphibians are associated with the various freshwater wetland habitats on the Humboldt Bay NWR and breed in freshwater ponds near Salmon Creek (see Appendix K of the CCP for species list).

Monitoring
The Refuge will continue with partners to monitor the use of Salmon Creek and Hookton Slough habitats by salmonids, tidewater gobies, amphibians, and passerine birds. The Refuge will establish a permanent tidal elevation station on Hookton Slough to quantify tidal change over time and tide gate function. The Refuge will coordinate with partners to monitor for any potential effects from the Salmon Creek restoration activities on eelgrass beds. See also the discussion of monitoring during hunting, below.

Hunting
Monitoring is expanded upon during hunting season when the Refuge staff conducts hunters' bag checks. The Refuge staff conducts daily bag checks to verify the number and species of waterfowl harvested to promote compliance with regulations and allow the Refuge to keep biological data on species harvest to further assessment of cumulative impacts. The effects of hunting are discussed below.

This section includes the anticipated direct and indirect effects of hunting on wildlife species. Hunting would be allowed in each of the proposed alternatives. Hunting is a compatible public use and a wildlife management tool that can be used to help manage wildlife populations. Some wildlife disturbance will occur during the hunting seasons. Proper zoning and regulations will be designated to minimize any negative impacts to wildlife populations and other public visitors using the Refuge.

Direct effects of hunting include mortality, wounding, and disturbance (DeLong 2002). Hunting can alter behavior (i.e., foraging time), population structure, and distribution patterns of wildlife (Owens 1977, Raveling 1979, White-Robinson 1982, Thomas 1983, Madsen 1985, Bartelt 1987, Cole and Knight 1990). There also appears to be an inverse relationship between the numbers of birds using an area and hunting intensity (DeLong 2002). In Connecticut, lesser scaup were observed to forage less in areas that were heavily hunted (Cronan 1957). In California, the numbers of northern pintails on Sacramento NWR Refuge non-hunt areas increased after the first week of hunting and remained high until the season was over in early January (Heitmeyer and Raveling 1988). Following the close of hunting season, ducks generally increased their use of the hunt area; however, use was lower than before the hunting season began. Human-caused disturbances to wildlife that are associated with hunting includes loud noises and rapid movements, such as those produced by shotguns and boats powered by outboard motors. This disturbance, especially when repeated over a period of time, can cause waterfowl to change food habits, feed only at night, lose weight, or desert feeding areas (Madsen 1995, Wolder 1993).

These impacts can be reduced by the presence of adjacent sanctuary areas where hunting does not occur and birds can feed and rest relatively undisturbed. Sanctuaries, or non-hunt areas, have been identified as the most common solution to disturbance problems caused from hunting (Havera et al. 1992). Prolonged and extensive disturbances may cause large numbers of waterfowl to leave disturbed areas and migrate elsewhere (Madsen 1995, Paulus 1984). In Denmark, hunting disturbance effects were experimentally tested by establishing two sanctuaries (Madsen 1995). Over a 5-year period, these sanctuaries became two of the most important staging areas for coastal waterfowl. Numbers of dabbling ducks and geese increased 4 to 20 fold within the sanctuary (Madsen 1995). Thus, sanctuary and non-hunt areas are very important to minimize disturbance to waterfowl populations to ensure their continued use of the Refuges.

Intermittent hunting can be a means of minimizing disturbance, especially if rest periods in between hunting events are weeks rather than days (Fox and Madsen 1997). It is common for Refuges to manage hunt programs with non-hunt days. At Sacramento Refuge, 3 to 16 percent of pintails were located on hunted units during non-hunt days, but were almost entirely absent in those same units on hunt days (Wolder 1993). In addition, northern pintails, American wigeon, and northern shovelers decreased time spent feeding on days when hunting occurred on public shooting areas, as compared to non-hunt days (Heitmeyer and Raveling 1988). However, intermittent hunting may not always greatly reduce hunting impacts.

The California Department of Fish and Game (CDFG) is California's lead agency for management of fish, wildlife, and native plants - collectively called "wildlife." CDFG has trustee responsibility for the conservation and management of wildlife for the benefit and enjoyment of the public.

Resident game species are protected on refuges by both Federal and State laws and regulations to ensure that harvest rates do not negatively impact populations. The following table contains a summary of hunting seasons and bag limits for 2002-2007 for the game species on Humboldt Bay NWR.

Table E-4. 5-Year Hunt Program Summary, Humboldt Bay NWR

Hunt Season	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007
Permits Issued	481	843	1074	1255	1187
Fees Collected	1,972.50	3,533.50	4,715.00	5,651.50	4,815.00
Adult Hunters	380	669	900	1120	1037
Junior Hunters	78	140	124	98	118
Disabled Hunters	23	34	50	37	32
Refilled	N/A	N/A	246	163	247
Hunters Turned Away	485	762	777	933	842
Hunters	481	843	1057	1255	1187
Harvested Birds	901	1641	1829	2481	2218
Bird Average	1.9	1.9	1.7	1.8	1.9
Green-winged Teal	311	654	625	845	974
Wigeon	270	460	650	553	746
Shoveler	212	332	393	332	380
Pintail	75	131	139	245	298
Mallard	33	64	57	105	84
Goose (Aleutian)	N/A	N/A	65	274	240
Goose (Western)	N/A	N/A	230	127	166

Wildlife populations on the Refuge are able to sustain hunting and also support other wildlife-dependent priority uses. To manage the populations to support hunting, the Refuges adopt harvest regulations set by the State within Federal framework guidelines. The regulatory procedures that govern harvest are described in the section below.

By its very nature, hunting has very few positive effects on the target species while the activity is occurring. However, the Service has concluded that hunting has given many people a deeper appreciation of wildlife and a better understanding of the importance of conserving wildlife habitat, which has ultimately contributed to the Refuge System mission. In addition, hunters have contributed tens of millions of dollars towards the purchase and conservation of hundreds of thousands of acres of habitat. Furthermore, a goal of Humboldt Bay NWR is to provide visitors of all ages an opportunity to enjoy wildlife-dependent recreation. Of key concern to the Refuge is to offer a safe and quality program and ensure adverse effects are minimal.

Recreational hunting will remove individual animals, but does not negatively affect wildlife populations. To assure that populations are sustainable, the California Fish and Game Commission, in consultation with the CDFG, annually review the population censuses to establish season lengths and harvest levels. Each year the Refuge staff conducts habitat management reviews of each unit on the Refuge to evaluate habitat conditions and visitor service activities. The Service has concluded that, to date, wildlife population levels are sustainable and that the areas on the Refuge that are closed to hunting activities provide adequate sanctuaries for wildlife.

Harvest Management - Regulatory Procedures
Waterfowl populations throughout the United States are managed through an administrative process known as flyways, of which there are four (Pacific, Central, Mississippi and Atlantic) in the U.S. Humboldt Bay is within the Pacific Flyway (see Figure 1, in the CCP). The review of the policies, processes and procedures for waterfowl hunting are covered in the following documents.

NEPA considerations by the Service for hunted migratory game bird species are addressed by the programmatic document, "Final Supplemental Environmental Impact Statement: Issuance of Annual Regulations Permitting the Sport Hunting of Migratory Birds (FSES 88–14)," filed with the Environmental Protection Agency on June 9, 1988. The Service published a Notice of Availability in the Federal Register on June 16, 1988 (53 FR 22582) and the Record of Decision on August 18, 1988 (53 FR 31341). Annual NEPA considerations for waterfowl hunting frameworks are covered under a separate NEPA documentation. Further, in a notice published in the September 8, 2005, Federal Register (70 FR 53776); the Service announced its intent to develop a new Supplemental EIS for the migratory bird hunting program. Public scoping meetings were held in the spring of 2006, as announced in a March 9, 2006, Federal Register notice (71 FR 12216).

Because the Migratory Bird Treaty Act stipulates that all hunting seasons for migratory game birds are closed unless specifically opened by the Secretary of the Interior, the Service annually promulgates regulations (50 CFR Part 20) establishing the Migratory Bird Hunting Frameworks. The frameworks are essentially permissive in that hunting of migratory birds would not be permitted without them. Thus, in effect, Federal annual regulations both allow and limit the hunting of migratory birds.

The Migratory Bird Hunting Frameworks provide season dates, bag limits, and other options for the States to select that should result in the level of harvest determined to be appropriate based upon Service-prepared annual biological assessments detailing the status of migratory game bird populations. In North America, the process for establishing waterfowl hunting regulations is conducted annually. In the United States, the process involves a number of scheduled meetings (Flyway Study Committees, Flyway Councils, Service Regulations Committee, etc,) in which information regarding the status of waterfowl populations and their habitats is presented to individuals within the agencies responsible for setting hunting regulations. In addition, public hearings are held and the proposed regulations are published in the Federal Register to allow public comment.

For waterfowl, these annual assessments include the Breeding Population and Habitat Survey, which is conducted throughout portions of the United States and Canada, and is used to establish a Waterfowl Population Status Report annually. In addition, the number of waterfowl hunters and resulting harvest are closely monitored through both the Harvest Information Program (HIP) and Parts Survey (Wing Bee). Since 1995, such information has been used to support the adaptive harvest management (AHM) process for setting duck-hunting regulations. Under AHM, a number of decision-making protocols render the choice (package) of pre-determined regulations (appropriate levels of harvest), which comprise the framework offered to the States that year. California's Fish and Game Commission then selects season dates, bag limits, shooting hours and other options from the Pacific Flyway package. Their selections can be more restrictive, but can not be more liberal than AHM allows. Thus, the level of hunting opportunity afforded each State increases or decreases each year in accordance with the annual status of waterfowl populations.

Waterfowl - Flyway Analysis
As a result of the recent regulations, the estimated average annual duck harvest for the Pacific Flyway is 2.5 million birds, which represents approximately 18 percent of the estimated average annual U.S. harvest of 14 million ducks (USFWS 2005). The estimated average annual goose harvest for the Pacific Flyway is 383,091, which represents 10.8 percent of the estimated annual U.S. harvest of over 3.5 million geese.

For comparison, in 2005, the breeding duck population estimate for those areas surveyed (California, Oregon, Nevada, Utah and Washington) in the Pacific Flyway was 1,097,276 birds, which was a 22.7 percent increase from the 2004 average (USFWS 2005). The estimated average duck breeding population for these areas from 1994 to 2005 was approximately 1.10 million birds. Furthermore, by itself the 2007 Midwinter Waterfowl Survey Index for ducks wintering in California was approximately 4,000,000. These numbers serve to demonstrate the relative importance of these areas (especially California) in the Pacific Flyway for wintering waterfowl, rather than for waterfowl production. In fact, the vast majority of waterfowl wintering

and subsequently harvested in California and throughout the Pacific Flyway come from breeding grounds to the north.

Waterfowl - Regional Analysis
The estimated breeding duck population in California in 2005 was 618,241 birds, which was a 49 percent increase from the 2004 estimate (USFWS 2005). The average estimated breeding duck population for California from 1990 to 2005 was 605,263 birds. Mallards generally comprise more than half of each year's breeding population estimate. In addition to mallards, an estimated few thousand breeding Western Canada Geese can be added to comprise a general picture of the magnitude of California's waterfowl reproduction on an annual basis. In contrast, the Mid-winter Waterfowl Survey index for California totals 4 million ducks and 1 million geese in recent years, further illustrating the relative importance of California's overall wintering waterfowl capacity within the Pacific Flyway.

Annual harvest estimates for California indicate that approximately 1.5 million ducks and 130,000 geese have been harvested in recent years by some 65,000 waterfowl hunters (based on Federal Duck Stamp sales) (USFWS 2005).

For Humboldt County, where the Refuge is located, the estimated duck harvest was 15,713. The goose harvest for Humboldt County was 5,750. The estimated number of duck and goose hunters for Humboldt County in 2004 was 917 and 1,066 respectively. The harvest of common snipe (*Gallinago delicate*) in the county was 124, and there are no estimates for American coots (*Fulica americana*) (coots) and common moorhens (*Gallinula chloropus*) (moorhen) (CDFG 2006).

Waterfowl - Local Analysis
Waterfowl harvest is tracked at the Refuge by collecting information at the Refuge hunting check station. In 2005 to 2006, 1,255 hunters at the Refuge harvested 2,481 birds (2,080 ducks, 401 geese), with an average of 1.8 birds/hunter. Under Alternative A, effects of waterfowl harvest are expected to be similar to previous years. Harvest would be less under Alternative B, and slightly more under Alternative C.

Waterfowl - Conclusion
The hunting of waterfowl in the United States is based upon a thorough regulatory setting process that involves numerous sources of waterfowl population and harvest monitoring data. As a result of the regulatory options produced (AHM) in recent years, California hunter's estimated harvest of nearly 1.5 million ducks is approximately 12 percent of the total U.S. harvest of 12.3 million and 55 percent of the Pacific Flyway's 2.65 million harvest estimates (USFWS 2005). The comparative numbers for the estimated goose harvest yield percentages of 4.1 percent and 33 percent of the U.S. and Pacific Flyway totals, respectively. Furthermore, some forty CDFG administered public hunt areas allow take of approximately 12 to 15 percent and 7 percent of California's estimated duck and goose harvest, respectively. In California, the Refuge represents nearly 0.14 and 0.27 percent of all ducks and geese harvested, respectively (PFDB 2007). Because the percentage of all ducks and geese harvested on the Refuge is a fraction of the CDFG allowable percentages, the Service has concluded that the effects of hunting on the Refuge on these populations to be negligible. Although the percentage of waterfowl harvested at the Refuge is low, the Refuge takes additional steps to protect waterfowl populations by providing sanctuary areas and maintaining a program of intermittent hunt days. Maintaining these restrictions means that opening limited areas of the Ma-le'l Dunes Unit and providing two additional youth only hunt days at the Salmon Creek Unit as proposed under the preferred alternative would have only a negligible effect on waterfowl populations.

Based on this analysis, the Service has concluded that hunting associated with each of the alternatives would not have an adverse effect on local, regional, or Pacific Flyway waterfowl populations.

Wilson's snipe - Regional Analysis
Wilson's snipe, formally called common snipe (*Gallinago delicate*), is particularly well camouflaged with a striped head and back, white belly, and rusty tail. They are usually only seen when flushed from the edge of a marsh or pond. In flight they are fast and erratic.

Wilson's snipe is found throughout the United States. The U.S. Shorebird Conservation Plan (Brown et al. 2001) population estimates for snipe are two million. They breed from northern Alaska and Canada south

to the southwestern and northeastern United States and winter throughout much of the United States, all of Central America, the Caribbean, and northern South America. Snipe are fairly common from October to April on wet meadow and short, emergent wetland habitats throughout much of California. They are a year-round resident in parts of northeastern California (Airola 1980).

The 2006 Hunter Survey (CDFG 2006) reported a statewide harvest of 13,260 snipe with 124 birds harvested in Humboldt County. During 2005, the number of snipe hunters statewide was 1,512 with 74 hunters reported for Humboldt County (CDFG 2006).

Wilson's Snipe - Local Analysis
The Refuge has no information on the numbers of snipe taken on the Refuge. California State game regulations allow snipe hunting to occur the third Saturday in October extending for 107 days. Bag limits for snipe are eight birds per day. Snipe harvest rates are not expected to change significantly over time under any of the alternatives, because the hunting program will not change much over any of the alternatives – under the preferred alternative the Refuge will open Ma-le'l Dunes Unit to snipe hunting, but the Refuge staff does not anticipate a high demand for snipe hunting on the newly opened unit, due to their presence on small islands that are accessible by boat only, and through discussions with hunters.

Wilson's snipe - Conclusion
The Service has concluded that hunting associated with each of the alternatives will not have an adverse effect on local populations or statewide populations of Wilson's snipe.

Coot and Common Moorhen - Regional and Local Analysis
No regional or local data is available from the State Department of Fish and Game for either the coot or the common moorhen. California State game regulations allow a daily bag limit of 25 birds of either species (mixed or separate) per day.

Coot - Conclusion
The Refuge has no information on the numbers of coot taken on the Refuge. The Service does not expect coot harvest rates to change significantly over the life of the CCP (15 years) under any of the alternatives.

Common Moorhen - Conclusion
The Refuge has no information on the numbers of common moorhen taken on the Refuge. The Service does not expect common moorhen harvest rates to change significantly over the life of the CCP (15 years) under any of the alternatives. Common moorhens are not that common to the Refuge, as they are listed in local field guides as "accidental occurrences".

Effects of Hunting on Other Non-hunted Wildlife Species
Hunted species and other wildlife will possibly compete for habitat. While each species occupies a unique niche, there is only a finite amount of space available to satisfy various habitat requirements of water, food, cover, breeding, roosting, and fawning areas. So, while individuals of a species compete for habitat within the species niche, most species occupy space to the exclusion of many other species. Hunted species (waterfowl, coot, common moorhen, pheasant, and snipe) generally do not prey on other species at unacceptable levels. Harvesting these species would not result in a substantial decrease in biological diversity on the Refuges.

Hunting is a highly regulated activity and generally takes place at specific times and seasons (dawn, fall and winter) when the game animal is less vulnerable. Hunting is an appropriate wildlife management tool that can be used to manage game populations. Although, some wildlife disturbance to non-hunted wildlife will occur during the hunting seasons, proper zoning, regulations, and Refuge seasons will be designated to minimize any adverse effects to wildlife populations using the Refuges.

Human disturbance associated with hunting includes loud noises and rapid movements, such as those produced by shotguns. This disturbance, especially when repeated over a period of time, may compel waterfowl to change food habits, feed only at night, lose weight, or desert feeding areas (Wolder 1993, Madsen 1995). Presumably these same behavioral changes may occur by non-hunted wildlife species as a result of hunting-related noises and movements.

These indirect impacts are not significant on the Refuges since they can be reduced by the availability of adjacent sanctuary areas where hunting does not occur, and both hunted and non-hunted wildlife can feed and rest relatively undisturbed. Sanctuaries or non-hunt areas have been identified as the most common solution to disturbance problems caused from hunting (Havera et al. 1992).

Biological conflicts (all alternatives) would be minimized by applying the following management practices:
- Proper hunting zoning and regulations will be designated to minimize adverse effects to wildlife.
- The check station will process the hunters entry to and exit from the Salmon Creek Unit hunting area
- Federally approved non-toxic shot will be used for all hunting to help minimize the possibility of lead poisoning.
- No hunting will be allowed during the breeding season. Hunting will be allowed only during designated seasons for waterfowl and upland game birds.
- The areas closed to hunting activities will provide adequate sanctuaries for wildlife.
- Law enforcement presence will help minimize excessive harvest and other infractions (illegal use of lead shot, take of non-game species, littering, etc.).
- Firearms are permitted on the Refuge for public hunting under the provisions of 50 CFR part 32. Persons may carry unloaded firearms on the Refuges that are dismantled or cased in vehicles (50 CFR 27.42).
- ESA, section 7 consultations with USFWS and NOAA Fisheries will be completed to determine effects of the CCP on special status species/designated critical habitat on the Refuges. The Refuge will implement the conservation measures identified during section 7 consultation.
- The Refuge will provide information in Refuge kiosks about preventing the spread of invasive terrestrial and aquatic plant species.

Based on the above analysis, the Service has concluded that harvesting of hunted species (waterfowl, coot, common moorhen, and snipe) would not result in a substantial decrease in biodiversity or adversely affect populations of hunted or non-hunted species.

Fishing
Because the demand for fishing is expected to remain light, fishing areas are limited on the Refuge, and multiple other fishing opportunities are available within 15 minutes from the Refuge and throughout the Humboldt Bay area, the Service has concluded that fishing on the Refuge would have no adverse effects on fish or wildlife populations.

Alternative A: No Action
Under Alternative A, current management of the Refuge would continue unchanged. The Refuge would continue to provide high quality habitat for migratory waterfowl, shorebirds, and other waterbirds through intensive habitat management activities. Other wildlife species would also benefit from the current management plan. These species include raptors, songbirds, and other migratory and resident fish and wildlife. The Refuge's visitor services program, including the hunting program, would also continue unchanged. Overall there will be a positive effect on wildlife from the current habitat management plan.

Hunting
Alternative A would continue the existing hunt program; therefore, harvest levels are expected to remain similar to previous years. The effects of hunting with Alternative A would be as described under the Common to All Alternatives section, above. As stated above, the Service does not anticipate adverse impacts to non target wildlife populations due to hunting.

Fishing
Alternative A has no changes proposed to the existing fishing plan and fishing would continue to be managed by the State of California. Alternative A would allow public sport fishing to continue as it does now within the Refuge boundary. Because the demand for fishing is expected to remain light fishing areas are limited on the Refuge, and multiple other fishing opportunities are available within minutes from the Refuge and throughout the Humboldt Bay area, the Service has concluded that fishing on the Refuge under Alternative A would have no adverse effects on fish or wildlife populations.

Salmon Creek Delta Restoration
Under Alternative A, Phase II of the Salmon Creek Restoration Plan will not be occurring.

Salt Marsh Habitat
Alternative A states that the Refuge will maintain 313 acres of existing coastal salt marsh habitat. The salt marsh provides habitat for fish, invertebrates, many shorebirds, and some waterbirds. The salt marsh provides habitat for the endangered tidewater goby; several species of threatened salmonids; and eulachon, a California Species of Special Concern currently under the Endangered Species Act. Without improved habitat, salmonid use of the project area would not increase and may continue to decline. This action would also provide additional benefits to other wildlife species that use salt marsh and brackish marsh habitat. A complete list of species that use this habitat is included in Appendix K.

Freshwater and Brackish Marsh
Maintenance of existing freshwater and brackish marsh is outlined in Alternative A. Short-grass pasture will be enhanced for use by Aleutian cackling goose population. Soil testing and PH maintenance will be ongoing. These two habitat types help sustain a variety of waterfowl, shorebirds, passerines, and wading birds, as well as the raptors that prey upon them and other animals. In addition, otters, weasels, frogs, salamanders, and invertebrates use freshwater marsh habitat. Sloughs lined by brackish marsh are used by threatened salmonids and endangered tidewater gobies. Without improved habitat, salmonid use of the project area would not increase and may continue to decline. This action will not provide additional benefits to other wildlife species that use salt marsh and brackish marsh habitat.

Riparian Swamp Habitat
With Alternative A, within the life of the CCP, Refuge staff would continue to maintain 35 acres of existing riparian swamp habitat and continue to plant native riparian swamp vegetation in portions of agricultural wetlands. The Refuge would also remove 20 acres of non-native Eucalyptus trees. The riparian swamp is a diverse vegetative community that provides valuable travel corridors for wildlife and habitat supporting biological integrity and environmental health on the refuge. Riparian forests provide rich habitat for a wide variety of plant species, mammals, reptiles, amphibians, and especially migrating and nesting songbirds, and improve conditions for fish by contributing nutrients, shade, and cover to streams. These actions would benefit all wildlife that use these habitats. For a list of species and their primary habitat types, please see Appendix K.

Dune Habitats (including dune mat/foredune grassland, dune swale, dune riparian/swamp, and coniferous dune forest)
Under Alternative A, the Refuge would maintain 125 acres of dune mat/foredune grassland, maintain 67 acres of dune swale, maintain 33 acres of dune riparian/swamp habitat, and maintain and restore 180 acres of coniferous dune forest plant communities. While dune mat/foredune grasslands are known to be rich habitats wildlife, the lack of adequate information on wildlife use of this habitat makes it difficult to prioritize management of this habitat when compared with other management needs of the Refuge.

Dune swales provide valuable habitat for several species of reptiles and amphibians including the northern red-legged frog, a California Species of Special Concern (SSC). Several bird SSC also use dune swale habitat including black-capped chickadee, yellow warbler, and Cooper's hawk. Many mammal species also use this habitat for foraging and cover, as well as for breeding by small mammals. Given the rarity of dune swale habitat and its value to wildlife, removal of invasive plant species and restoration of native plant species is necessary for the maintenance of the biological integrity, diversity, and environmental health of the dune ecosystem as well as to protect many California Species of Special Concern. A list of species that would benefit from increasing this habitat type is included in Appendix K.

Dune riparian/swamp habitat provides valuable habitat for several species of reptiles and amphibians. Many species of migratory birds use dune riparian/swamp habitat; as well as several SSC bird species including: Vaux's swift, willow flycatcher, yellow-breasted chat, and a CESA-listed threatened bird, the bank swallow. The SSC yellow warbler is a bird that nests in this habitat type. Many mammals also make use of dune riparian/swamp habitat for foraging, cover, and breeding. Maintaining and restoring this habitat will contribute to the biological integrity, diversity, and environmental health of these rare dune habitat types. Currently there are no adequate surveys of plants and wildlife species, including invertebrates, that are resident or migratory inhabitants of riparian/swamp habitats on the dune units. While riparian swamps are known to be rich habitats for wildlife, the lack of adequate information on wildlife use of dune riparian/swamp habitat makes it difficult to estimate impacts from Refuge management activities. Some wildlife

will be temporarily displaced while restoration work is being done, but return after work is complete and humans leave the area. However, some individuals, particularly plants and invertebrates may be harmed during restoration activities. With the use of conservation measures, (Appendix 1) overall, populations of species that use dune habitats (listed in Appendix K) would benefit from the restoration portion of Alternative A.

Based on the above analysis, the Service has concluded that overall, because of proposed restoration activities, beneficial effects to fish and wildlife are anticipated with Alternative A, which continues the current habitat management, hunting, and fishing programs.

Alternative B

Under Alternative B, habitat management and restoration will be increased over alternative A to provide a greater level of benefit to waterfowl, other wetland-dependent birds, other migratory birds, and resident fish and wildlife. Food and cover production, water quality, and overall habitat availability based on annual abundance and migratory patterns will be optimized. Relative to Alternative A, the number and frequency of surveys would be increased to monitor a more comprehensive list of fish and wildlife species and the habitat upon which they depend. Examples would include a greater level of monitoring for the abundance/distribution of waterfowl, shorebirds, raptors, neo-tropical migrants, fish and water quality, vegetation in all habitat types, aquatic and terrestrial insects, and other species or habitat communities. This will allow for more detailed information to further refine and improve management of the Refuge.

Overall, this alternative will have additional positive impacts on wildlife compared to Alternative A, as there are additional restoration and improvement goals. As described in the section in Plant Communities, Alternative B would allow mowing and/or cattle grazing on the central portion of the Hookton Slough Unit, which should promote short-grass pasture favored by Aleutian cackling geese and associated species. In conjunction with the existing hazing program, providing more short-grass pasture on the refuge is expected to increase the presence of Aleutian cackling goose use on the refuge and reduce the intensity of goose use on adjacent private pastureland.

Hunting

Alternative B provides additional undisturbed area for wildlife and reduces potential for hunter/nonhunter conflicts by closing Teal Island and Hookton Slough areas to overwater hunting. As stated under the Common to All Alternatives section on hunting, the Service does not anticipate adverse impacts to non target wildlife populations due to hunting.

Fishing

Alternative B is similar to Alternative A, but includes increased signage and outreach. Placing additional signage at the Refuge would include digging post holes and associated minor construction involved with installing signs. No additional impacts to fish would occur because all work would be done on existing trails or developed facilities. There would be no work in the water. Because of the relatively limited opportunity for fishing, there will be no facilities developed or managed specifically for the use of anglers. Fishing is not expected to increase significantly with increased signage and outreach, Because the demand for fishing is expected to remain light, fishing areas are limited on the Refuge, and multiple other fishing opportunities are available within minutes from the Refuge and throughout the Humboldt Bay area, the Service has concluded that fishing on the Refuge under Alternative B would have no adverse effects on fish or wildlife populations.

Salmon Creek Delta Restoration

Alternative B includes Phase II of the Salmon Creek Restoration, which includes:

- Relocation of the reach of Salmon Creek channel within the Refuge that currently flows through a linear ditch. A new channel will be constructed in the upper reach of tidal influence, and include a stable channel form, historic habitat complexity and sinuosity, and improved routing of sediment and flood waters.
- Construct off-channel estuarine wetlands and side-channels in upper reach for salmonid rearing habitat and channel maintenance.
- Screen existing high-flow water diversion to eliminate stranding.

Relocation of Salmon Creek to restore the sinuosity involves replacing a straightened channel section and creating one that is more sinuous. The excavation of the 1,500 linear foot channel would be done "in the dry"; the only work in the water involves removing the plugs to connect the new channel section to the existing creek, thus replacing the straightened channel with one that is meandering and "natural" in function and appearance.

The off-channel estuarine wetlands and side-channels would also be constructed in the dry, until opening them up to Salmon Creek.

Earth removed from these excavations will be used to raise the Salmon Creek overflow marsh, and some areas of the White Slough Unit. Prior to raising the elevation of the marsh, plants and topsoil will be salvaged (removed and stored in a manner to ensure viability for transplanting). After the existing salt marsh vegetation is salvaged from the restoration site, approximately 12 inches of topsoil would be removed from the site. The native topsoil is saved to retain the native soil micronutrients and soil organisms. The stockpiled topsoil and salvaged plants would be stored as near as possible to the salt marsh restoration area on Humboldt Bay NWR lands. Topsoil stockpile locations would be placed at least 100 feet away from a body of water and protected from erosion to avoid loss of soil and runoff. Conservation measures would be required as part of the restoration activities to protect water quality and avoid soil compaction in areas outside of the restoration area. Once topsoil had been removed, clean, appropriate fill material would be spread on the marsh plain to raise the elevation of the plain. The Service expects that the estimated 10,000 to 12,000 cubic yards of soil excavated to create the meandering creek channel for the proposed Phase II of Salmon Creek Restoration project on the Refuge would be the source of the fill soil. After the fill material is placed to raise the marsh plain, the stockpiled topsoil would be spread on top of the fill material. Finally, the salvaged native salt marsh plants and additional native plants would be used to revegetate the raised marsh plain.

Phase II of the Salmon Creek Restoration project will result in the direct adverse impact to amphibians, insect, and other small instream and riparian fauna in the immediate project area. Small mammals and other less mobile life forms, which use the area, may suffer direct mortality. Indirect adverse impacts will include a reduction of insect, amphibian, and other aquatic flora and fauna in the immediate vicinity, and downstream of, the project reach resulting from increased sediment loads caused by restoration activity. Conservation measures will be used to minimize sediment loads and other impacts.

The Salmon Creek restoration activities involve earthmoving equipment that could introduce various contaminants, such as fuel oils, grease, and other petroleum products, either directly from equipment or indirectly through surface runoff. Contaminants could temporarily adversely affect fish and wildlife if the following conditions occur: accidental spill of construction-related or hazardous materials, increased sedimentation or erosion, Effects to water quality from an accidental spill of construction-related or hazardous materials, and increased sedimentation or erosion, are included in the Water Quality section. The conservation measures to avoid or minimize adverse affects to water quality will also avoid or minimize adverse affects to fish and wildlife (see Appendix 1).

Direct benefits of the Salmon Creek Restoration include restoring habitat for salmonids and other fish species to habitat which had become less diverse, with higher velocity due to unnatural causes, and is expected to reduce fish strandings during high water events. Indirect benefits include: 1) creating instream and side channel habitat complexity to provide escape cover for juvenile salmonids and other aquatic species; 2) increasing stream bank stability, leading to decreased sedimentation to the stream and lower levels of turbidity and aggradation – increasing the extent of suitable salmonid spawning areas and survival of fry and smolts, 3) enhanced survival of riparian vegetative cover, which promotes cleaner, colder water; increasing survival of young salmonids; 4) creation of pools, backwater areas, and side channels – which provide habitat as refugia from current velocity and temperature extremes. For a discussion of effects on salmonids and the tidewater goby, please see the section on Special Status Species, below.

Salt Marsh Habitat

In addition to what is detailed in Alternative A, Alternative B proposes to restore of 90 acres of salt marsh habitat on the Hookton Slough Unit, and 35 acres on the White Slough Unit. Restoration of this habitat may harm some species during the restoration phase, but will be a long-term benefit overall. Efforts to minimize fish and wildlife disturbance will be employed, such as using the conservation measures found

in Appendix 1, timing to avoid nesting birds, and surveys before any activities that have the potential to disturb fish and wildlife. The salt marsh provides habitat for fish, invertebrates, many shorebirds, and some waterbirds. The salt marsh provides habitat for the endangered tidewater goby; several species of threatened salmonids; and eulachon, a California Species of Special Concern currently under Endangered Species Act.

Some wildlife will be temporarily displaced while restoration work is being done, but return after work is complete and humans leave the area. However, some individuals, particularly plants and invertebrates may be harmed during restoration activities. With the use of conservation measures (Appendix 1), overall, populations of species that use salt marsh would benefit from the restoration of salt marsh habitat included in Alternative B is included in Appendix K.

Freshwater and Brackish Marsh
In addition to what is detailed in Alternative A, Alternative B proposes to improve 100 acres of freshwater brackish marsh on the SCU and HSU. On the TBU, 13 acres of pasture vegetation will be restored to brackish marsh within 7 years. Maintenance of freshwater brackish marsh on the WSU would be reduced from Alternative A's 50 acres to 23 acres under Alternative B. Water management would be improved through the construction of interior levees on the SCU. All proposed work is designed for and is expected to benefit wildlife species in the long-term. These two habitat types help sustain a variety of waterfowl, shorebirds, passerines, and wading birds, as well as the raptors that prey upon them and other animals. In addition, otters, weasels, frogs, salamanders, and invertebrates use freshwater marsh habitat. Sloughs lined by brackish marsh are used by threatened salmonids and endangered tidewater gobies. A complete list of species that use these habitats is included in Appendix K.

As described above in the Plant Communities section (under Alternative B), allowing cattle grazing on the central portion of the Hookton Slough Unit is expected to promote short grass pasture favored by Aleutian cackling geese and associated species. In conjunction with the existing hazing program, providing more short grass pasture on the Refuge is expected to increase the intensity of Aleutian cackling goose use on the Refuge and reduce the intensity of goose use on adjacent private pastureland. The expected increase of goose use on the Refuge is anticipated to be a beneficial effect for the geese and the region, with no anticipated adverse effects to fish and other species of wildlife on the Refuge.

Riparian Swamp Habitat
Under Alternative B, the Refuge staff would manage 35 acres of existing riparian swamp habitat and continue to plant native riparian/swamp vegetation in portions of agricultural wetlands. The Refuge would also remove 20 acres of non-native tree within 5 years instead of 15 years. This diverse vegetative community provides valuable travel corridors for wildlife and habitat supporting biological integrity and environmental health on the refuge. Riparian forests provide rich habitat for a wide variety of plant species, mammals, reptiles, amphibians, and particularly migrating and nesting songbirds; and improve conditions for fish by contributing nutrients, shade, and cover to streams. By eliminating non-native trees and planting native vegetation, native species would have more available food and cover, which would result in a beneficial effect to native species. See Appendix K for a list of these species.

Dune Habitats (including dune mat/foredune grassland, dune swale, dune riparian/swamp, and coniferous dune forest)
Under Alternative B, the Refuge would conduct the same management actions for dunemat/foredune grassland habitat as that described under Alternative A, except the actions would involve restoration in addition to maintenance. For dune swale habitat, over a 15 year period, the Refuge would not only maintain, but also restore 67 acres of dune swale. For dune riparian/swamp habitat, within 10 years, the Refuge would restore 33 total acres of dune riparian/swamp. The Refuge would conduct the same management actions for coniferous dune forest habitat as that described under Alternative A. In addition, within 10 years the Refuge would restore Ma-le'l Dunes Unit forest margins dominated by European beach grass to native coniferous forest communities.

As explained in more detail in the section describing the alternatives, Alternative B includes various research on the dune mat; an inventory of wildlife in the dune mat/foredune grassland and dune riparian/swamp; and research by partners on neo-tropical birds and coniferous dune forest ecology. Wildlife

inventories and research data would allow the Refuge to gain a more comprehensive understanding of animal species that utilize riparian swamp, dune mat/foredune grassland, and dune swale habitats on the Ma-le'l and Lanphere Dunes Units. Currently there are no adequate surveys of wildlife species (besides birds) that are resident or migratory inhabitants of dune riparian/swamp habitats on the dune units. While riparian swamps are known to be rich habitats for wildlife, the lack of adequate information on wildlife use of dune riparian/swamp habitat makes it more challenging for the Refuge staff to determine the effects of restoration. With the data and information from the aforementioned research and inventories, the Service expects that it would better inform decision-making for all habitat management activities; improving all aspects of habitat management. Increased research is expected to benefit all native species that use the Refuge.

Dune swales provide valuable habitat for several species of reptiles and amphibians including the northern red-legged frog, a SSC. Several bird SSC also use dune swale habitat including black-capped chickadee, yellow warbler, and Cooper's hawk. Many mammal species also use this habitat for foraging and cover, as well as for breeding by small mammals. Dune riparian forest/swamp habitat provides valuable habitat for several species of reptiles and amphibians. Many species of migratory birds use dune riparian/swamp habitat; as well as several SSC bird species including: Vaux's swift, willow flycatcher, yellow-breasted chat, and a CESA listed threatened bird, the bank swallow. The SSC yellow warbler is a bird that nests in this habitat type. Many mammals also make use of dune riparian/swamp habitat for foraging, cover, and breeding. Maintaining and restoring this habitat will contribute to the biological integrity, diversity, and environmental health of these rare dune habitat types. Given the rarity of dune swale habitat and its value to wildlife, removal of invasive plant species and restoration of native plant species is necessary for the maintenance of the biological integrity, diversity, and environmental health of the dune ecosystem as well as to protect many California Species of Special Concern. Species that would benefit from increasing the dune habitats are listed in Appendices J and K.

Some wildlife will be temporarily displaced while restoration work is being done, but return after work is complete and humans leave the area. However, some individuals, particularly plants and invertebrates may be harmed during restoration activities. With the use of conservation measures (Appendix 1), overall, populations of species that use dune habitats would benefit from the restoration included in Alternative B. The Service anticipates that the eliminating the European beach grass will benefit native species that use these habitats. Based on the above analysis, the Service has concluded that although there will be some short term displacement and harm to fish and wildlife individuals, long term beneficial effects to fish and wildlife populations are anticipated with Alternative B.

Alternative C: Preferred Alternative

Alternative C would provide the greatest benefit to fish and wildlife due to the increased restoration and improvement goals over Alternative B. Alternative C would provide the greatest benefit especially to listed fish and wildlife species (as discussed in the Special Status Species section, below). An active pasture management program on this refuge focuses on providing short-grass habitat preferred by Aleutian cackling geese during their wintering period from fall through early spring. Refuge grasslands are grazed and mowed during the goose "off-season" (May-October) in order to maintain the grass species composition and vegetation in the condition that the geese respond to during their use period (November-April).

Hunting

Alternative C is similar to Alternative A and opens limited areas of the Ma-le'l Dunes Unit to waterfowl, coot, and snipe hunting and retrieval and provides 2 additional youth only hunting days on the Salmon Creek Unit. For a further discussion of impact due to hunting, please see pages 52-57.

Fishing

Alternative C includes adoption of the Draft Sport Fishing Plan, Humboldt Bay NWR (USFWS, 2008) (Appendix D). Fishing is not expected to change substantially or increase with the 2008 Sport Fishing Plan, Because the demand for fishing is expected to remain light, fishing areas are limited on the Refuge, and multiple other fishing opportunities are available within minutes from the Refuge and throughout the Humboldt Bay area, the Service has concluded that fishing on the Refuge under Alternative C would have no adverse effects on fish or wildlife populations.

Salmon Creek Delta Restoration

Alternative C (as with Alternative B), includes Phase II of the Salmon Creek Restoration, which includes:

- Relocation of the reach of Salmon Creek channel within the Refuge that currently flows through a linear ditch. A new channel will be constructed in the upper reach of tidal influence, and include a stable channel form, historic habitat complexity and sinuosity, and improved routing of sediment and flood waters.
- Construct off-channel estuarine wetlands and side-channels in upper reach for salmonid rearing habitat and channel maintenance.
- Screen existing high-flow water diversion to eliminate stranding.

Relocation of Salmon Creek to restore the sinuosity involves replacing a straightened channel section and creating one that is more sinuous. The excavation of the 1,500 linear foot channel would be done "in the dry"; the only work in the water involves removing the plugs to connect the new channel section to the existing creek, thus replacing the straightened channel with one that is meandering and "natural" in function and appearance.

The off-channel estuarine wetlands and side-channels would also be constructed in the dry, until connecting them up to Salmon Creek.

Earth removed from these excavations will be used to raise the Salmon Creek overflow marsh, and some areas of the White Slough Unit. Prior to raising the elevation of the marsh, plants and topsoil will be salvaged (removed and stored in a manner to ensure viability for transplanting). After the existing salt marsh vegetation is salvaged from the restoration site, approximately 12 inches of topsoil would be removed from the site. The native topsoil is saved to retain the native soil micronutrients and soil organisms. The stockpiled topsoil and salvaged plants would be stored as near as possible to the salt marsh restoration area on Humboldt Bay NWR lands. Topsoil stockpile locations would be placed at least 100 feet away from a body of water and protected from erosion to avoid loss of soil and runoff. Conservation measures would be required as part of the restoration activities to protect water quality and avoid soil compaction in areas outside of the restoration area. Once topsoil had been removed, clean, appropriate fill material would be spread on the marsh plain to raise the elevation of the plain. The Service expects that the estimated 10,000 to 12,000 cubic yards of soil excavated to create the meandering creek channel for the proposed Phase II of Salmon Creek Restoration project on the Refuge would be the source of the fill soil. After the fill material is placed to raise the marsh plain, the stockpiled topsoil would be spread on top of the fill material. Finally, the salvaged native salt marsh plants and additional native plants would be used to revegetate the raised marsh plain.

Phase II of the Salmon Creek Restoration project will result in the direct adverse impact to amphibians, insect, and other small instream and riparian fauna in the immediate project area. Small mammals and other less mobile life forms, which use the area, may suffer direct mortality. Indirect adverse impacts will include a reduction of insect, amphibian, and other aquatic flora and fauna in the immediate vicinity, and downstream of, the project reach resulting from increased sediment loads caused by restoration activity. Conservation measures will be used to minimize sediment loads and other impacts.

The Salmon Creek restoration activities involve earthmoving equipment that could introduce various contaminants, such as fuel oils, grease, and other petroleum products, either directly from equipment or indirectly through surface runoff. Contaminants could temporarily adversely affect fish and wildlife if the following conditions occur: accidental spill of construction-related or hazardous materials, increased sedimentation or erosion, effects to water quality from an accidental spill of construction-related or hazardous materials, and increased sedimentation or erosion, are included in the Water Quality section. The conservation measures to avoid or minimize adverse affects to water quality will also avoid or minimize adverse affects to fish and wildlife (see Appendix 1).

Direct benefits of the Salmon Creek Restoration include restoring habitat for salmonids and other fish species to habitat which had become less diverse, with higher velocity due to unnatural causes, and is expected to reduce fish strandings during high water events. Indirect benefits include: 1) creating instream and side channel habitat complexity to provide escape cover for juvenile salmonids and other aquatic species; 2) increasing stream bank stability, leading to decreased sedimentation to the stream and lower levels of turbidity and aggradation – increasing the extent of suitable salmonid spawning areas and survival

of fry and smolts, 3) enhanced survival of riparian vegetative cover, which promotes cleaner, colder water; increasing survival of young salmonids; 4) creation of pools, backwater areas, and side channels – which provide habitat as refugia from current velocity and temperature extremes. For a discussion of effects on salmonids and the tidewater goby, please see the section on Special Status Species, below.

In addition to the effects described above, Alternative C includes excavation of approximately 500 feet of channel to connect the new channel to off-channel salmonid rearing habitat (in Cattail Creek) and securing large woody debris within Hookton Slough would increase available salmonid rearing and shaded riverine aquatic habitat, which is expected to provide beneficial effects to salmonid and tidewater goby habitat. The placement of the large woody debris will be from the bank/dike, and will not involve machinery driving in the water. These proposed actions will further improve salmonid and other fisheries habitat, as well as improve riparian and instream habitat for other species.

Salt Marsh Habitat
Under Alternative C, the salt marsh habitat would increase by 10 acres on the White Slough Unit over Alternative B due to restoration. A 37-acre increase of restored salt marsh (relative to Alternative B) would occur on the Hookton Slough Unit. One hundred acres of salt marsh habitat would be restored on the Table Bluff Unit. Though there will be minimal short term impacts to species using the salt marsh, all proposed work is designed for and is expected to benefit wildlife species in the long-term. The salt marsh provides habitat for fish, invertebrates, many shorebirds, and some waterbirds. The salt marsh provides habitat for the endangered tidewater goby; several species of threatened salmonids; and eulachon, a California SSC on the watch list because of reduced distribution. A complete list of species that use this habitat type and are expected to benefit from the restoration of salt marsh habitat is included in Appendix K.

Freshwater and Brackish Marsh
Under Alternative C, the Refuge will implement a restoration plan that allows for partial tidal restoration in central area, with muted tidal influence to east and west areas, while allowing for fish passage, salmonid rearing and tidewater goby habitat on the Hookton Slough Unit. On Salmon Creek Unit, enhanced drainage in short-grass areas would create more favorable conditions for grass and Aleutian cackling geese. Interior dike removal around Headquarters unit and adjacent to Long Pond on SCU will enhance wetland values. A low contour levee near duck ponds on SCU will be created to impound water. All proposed work is designed for and is expected to benefit wildlife species in the long-term, but there will be minor short term impacts to less motile species, primarily small mammals, amphibians, and invertebrates. These two habitat types help sustain a variety of waterfowl, shorebirds, passerines, and wading birds, as well as the raptors that prey upon them and other animals. In addition, shorebirds, waterfowl, otters, weasels, frogs, salamanders, and invertebrates use freshwater marsh habitat. Sloughs lined by brackish marsh are used by threatened salmonids and endangered tidewater gobies. All species that use these habitats are expected to benefit from restoration activities in the long term. A complete list of species that use this habitat type and are expected to benefit from the restoration of freshwater and brackish marsh is included in Appendix K.

Riparian Swamp Habitat
The Refuge would implement the same management actions for riparian/swamp habitat as those described under Alternative B. In addition, the Refuge would revegetate an additional 14 acres of the eastern portion of the White Slough Unit with native riparian/swamp vegetation. If the railroad authority declines to open their tidegates, Refuge staff would implement restoration of riparian/swamp habitat on the northern 16 acres of the White Slough Unit. This diverse vegetative community provides valuable travel corridors for wildlife and habitat supporting biological integrity and environmental health on the refuge. Riparian forests provide rich habitat for a wide variety of plant species, mammals, reptiles, amphibians, and especially migrating and nesting songbirds, and improve conditions for fish by contributing nutrients, shade, and cover to streams. See Appendix K for a complete list of species that will benefit.

Dune Habitats (including dune mat/foredune grassland, dune swale, dune riparian/swamp, and coniferous dune forest)
Dunemat/foredune grassland management actions would include all of those actions described under Alternative B. The Refuge would restore and maintain dune swale plant communities, as described under Alternative B, however all restoration work would be completed within 10 years. The Refuge would restore dune riparian/swamp habitat as described under Alternative B, and restoration work would be completed

over a ten year period also. The Refuge would conduct the same restoration and maintenance actions for coniferous dune forest habitat as those described under Alternative B. In addition, within 5 years, the Refuge would restore European beach grass-dominated dunes on Ma-le'l Dunes Unit forest margins to coniferous forest. Dune swales provide valuable habitat for several species of reptiles and amphibians including the northern red-legged frog, a California Species of Special Concern (SSC). Several bird SSC also use dune swale habitat including black-capped chickadee, yellow warbler, and Cooper's hawk. Many mammal species also use this habitat for foraging and cover, as well as for breeding by small mammals.

Dune riparian forest/swamp habitat provides valuable habitat for several species of reptiles and amphibians including the northern red-legged frog, a California SSC. Many species of migratory birds use dune riparian/swamp habitat; as well as several SSC bird species including: Vaux's swift, willow flycatcher, yellow-breasted chat, and a CESA listed threatened bird, the bank swallow. The SSC yellow warbler is a bird that nests in this habitat type. Many mammals also make use of dune riparian/swamp habitat for foraging, cover, and breeding. Maintaining and restoring this habitat will contribute to the biological integrity, diversity, and environmental health of these rare dune habitat types.

Currently there are no adequate surveys of plants and wildlife species, including invertebrates, that are resident or migratory inhabitants of riparian/swamp habitats on the dune units. While riparian swamps are known to be rich habitats for wildlife, the lack of adequate information on wildlife use of dune riparian and swamp habitat makes it difficult to assess the impacts of restoration on wildlife in the area. See Appendix K for a list of species that will benefit.

Some wildlife will be temporarily displaced while restoration work is being done, but return after work is complete and humans leave the area. However, some individuals, particularly plants and invertebrates may be harmed during restoration activities. With the use of conservation measures (Appendix 1), overall, populations of species that use salt marsh would benefit from the restoration of salt marsh habitat included in Alternative B is included in Appendix K. Based on the above analysis, the Service has concluded that although there will be some short term displacement and harm to fish and wildlife individuals, long term beneficial effects to fish and wildlife populations are anticipated with Alternative C.

Cumulative Effects

The Service has concluded that the effects of any of the alternatives on the regional cumulative impact on fish and wildlife in general would be cumulatively positive, but less than cumulatively considerable.

Special Status Species

The northern California Evolutionarily Significant Unit (ESU) of the Coho salmon (*Oncorhynchus kisutch*), the California coastal ESU of the Chinook salmon (*O. tshawytscha*), the northern California ESU of the steelhead (*O. mykiss*), and the Southern Distinct Population Segment (DPS) of the North American green sturgeon (*Acipenser medirostris*) are listed as threatened under the Federal Endangered Species Act, as amended. The Refuge's Salmon Creek is considered habitat for and is used by the migratory salmon and steelhead. The green sturgeon is present in Humboldt Bay. The Hookton Slough area is habitat for the Federally listed as endangered tidewater goby (*Eucyclogobius newberryi*). And, the tidewater goby uses areas of Salmon Creek on the Refuge. The Federally listed as endangered Humboldt Bay wallflower (*Erysimum menziesii ssp. Eurekense*) and beach layia (*Layia carnosa*) grow at Lanphere Dunes and Ma-le'l Dunes Units of the Refuge. Other Federally listed species that are known to use the Humboldt Bay NWR are: the Federally listed as threatened Brown Pelican (*Pelecanus occidentalis*), the coastal population of the Western Snowy Plover (Pacific Coastal Population) (*Charadrius alexandrinus nivosus*), and marbled murrelet (*Brachyramphus marmoratus*). Although the Northern Spotted Owl (*Strix occidentalis caurina*) is included in the Humboldt County list of Federally listed as threatened species, there is no habitat for this bird on the Refuge and it does not occur on the Refuge. Several listed arthropods appear on the Humboldt County list of Federally protected species, but they do not use the Refuge

Endangered Species Act, section 7 consultation is in progress with the Arcata Fish and Wildlife Office and NOAA Fisheries. The results of the consultation are scheduled to be released with the Final CCP/EA.

Common to All Alternatives

After Refuge staff removes (uproots) the dense-flowered cordgrass from the salt marsh, the uprooted or dead plant material (biomass) is raked into piles and burned. Dense-flowered cordgrass removal is done on about 100 acres at a time. These management actions can cause short-term turbidity in localized areas. These actions and any associated turbidity would not occur near habitat for listed fish. Effects to water and air quality are discussed in those sections, above.

The Refuge plans to introduce Humboldt Bay Wallflower and beach layia to 35 acres of unoccupied habitat at Lanphere Dunes Unit and to restored habitat at Ma-le'l Dunes and Table Bluff Units. The restoration work is done by hand in currently unoccupied habitat so the Service anticipates that there will be no adverse effects to either vegetation or wildlife. Dune restoration is expected to benefit the western snowy plover as well. A complete list of species, including special status species, that use the habitats listed below is included in Appendix K. A list of locally occurring special status species is provided in Appendix L.

Alternative A: No Action

Salmon Creek Delta Restoration

Increasing natural estuarine functions to the lower end of Salmon Creek should help to restore habitat important to listed (and other) fish species. Truly functional estuarine habitat around Humboldt Bay is rare. Ongoing work on Phase I of the Salmon Creek restoration project has and will continue to improve fish passage, water quality, and sediment and flood flow transport.

Salt Marsh Habitat

Chinook salmon, tidewater goby, eulachon, longfin smelt, Coho salmon, steelhead trout, and coastal cutthroat trout would all benefit from increasing salt marsh habitat. Some species use these habitats temporarily before migrating to the estuary, and all benefit from the food base the salt marsh provides. Alternative A will maintain 313 acres of salt marsh habitat, which would continue to benefit these species.

Freshwater and Brackish Marsh

Chinook salmon, tidewater goby, eulachon, longfin smelt, Coho salmon, steelhead trout, and coastal cutthroat trout would all benefit from increasing freshwater brackish marsh habitat also, as long as there is a hydrologic connection of these habitats with the estuary. Some species use these habitats temporarily before migrating to the estuary, and all benefit from the food base the marsh provides. Alternative A will maintain 630 acres of seasonal freshwater brackish marsh habitat, 50 acres at the Hookton Slough Unit, and 50 acres at the White Slough unit, which would continue to benefit these species.

Dune Habitats (including dune mat/foredune grassland, dune swale, dune riparian/swamp, and coniferous dune forest)

Alternative A includes on-going recovery, introduction, re-introduction, and assistance actions for the protection of Humboldt Bay wallflower and beach layia, which help to ensure the continued existence of these species.

Based on the above analysis, the Service has concluded that short term impact will be overshadowed by the long term beneficial effects to special status species anticipated with Alternative A.

Alternative B

Salmon Creek Delta Restoration

The Federally protected salmonids and the tidewater goby use areas of Salmon Creek. Upon completion of consultation with AFWO and NOAA Fisheries, all restoration activities will be in compliance with the Endangered Species Act. Phase II of the Salmon Creek Restoration project would restore about 1,500 linear feet of former creek channel; and increase estuarine and off-channel rearing habitat for salmonids and tidewater gobies. A fish screen will be needed to allow seasonal flooding to be directed to other Refuge wetlands without impacts to anadromous or resident fish species, since Federally-protected salmonids and the tidewater goby may use Salmon Creek. Upon completion of consultation with the AFWO and NOAA Fisheries, all restoration activities will be in compliance with the Federal Endangered Species Act (ESA). In compliance with the ESA, construction activities similar to those in Alternative B have been allowable in or near habitat for ESA-listed species when the listed species are expected not to be present or present only in very low numbers. Terms and conditions to protect listed species will be determined during ESA

consultation. The Refuge would use the material excavated to create the realigned Salmon Creek to raise the elevation of the Salmon Creek overflow marsh plane to create additional salt marsh and to restore the tidal prism. See the discussion under Salt Marsh Habitat, below.

Salt Marsh Habitat

As described above, the Refuge would use the excavated material from the Salmon Creek Restoration project to raise the elevation of the Salmon Creek overflow marsh plane to create additional salt marsh and to restore the tidal prism. This is expected to provide beneficial effects (relative to Alternative A) by improving water quality and increasing juvenile salmonid and tidewater goby habitat. Alternative B adds the restoration of 125 acres of salt marsh habitat which would directly or indirectly benefit Chinook salmon, tidewater goby, eulachon, longfin smelt, Coho salmon, steelhead trout, and coastal cutthroat trout. Creating more marsh habitat (fresh to salt) will create more rearing area, better water quality, increased forage, and ease the transition from fresh to saltwater for the anadromous species. The Refuge would also place local fill material to raise the tidal elevation of 60 acres of mudflat on Salmon Creek overflow.

Freshwater and Brackish Marsh

In addition to what is depicted in Alternative A, Alternative B states that approximately 100 acres would be improved on the Salmon Creek Unit and Hookton Slough Unit, 13 acres would be restored to brackish marsh on TBU, but maintenance of fresh water brackish marsh would be reduced on the White Slough Unit from 50 acres maintained to 23 acres maintained.

For freshwater marsh, this means modifying existing ponds and providing a larger overflow drainage ditch to seasonal wetlands. For brackish marsh, this would entail excavating portions of the marsh to mimic the pre disturbance appearance of old aerial photographs of the area. As standard operating procedures, conservation measures would be employed, as would a biological survey of the area before excavation occurs.

These two habitat types help sustain a variety of waterfowl, shorebirds, passerines, and wading birds, as well as the raptors that prey upon them and other animals. In addition, otters, weasels, frogs, salamanders, and invertebrates use freshwater marsh habitat. Sloughs lined by brackish marsh are used by threatened salmonids and endangered tidewater gobies. A complete list of species, including special status species that use these habitats is included in Appendix K. This would still be beneficial in the long term for fishes that use this habitat, for reasons listed above in the salt marsh habitat section.

Dune Habitats (including dune mat/foredune grassland, dune swale, dune riparian/swamp, and coniferous dune forest)

The Refuge would continue to support recovery efforts for the Humboldt Bay wallflower (wallflower) and beach layia (layia), on Humboldt Bay NWR, through restoration of 14 acres of Ma-le'l Dunes habitat and restoration of 22 acres of Table Bluff habitat. Within 5 years, the Refuge would reintroduce the wallflower and the layia to 35 acres of unoccupied habitat at Lanphere Dunes and restored habitat at Ma-le'l and Lanphere dunes. The Refuge staff would also work with partners to protect wallflower and layia populations on the South Spit, Elk River Spit, the airport, and the Manila Dunes. The Refuge would also work with the Service's Ecological Services Program to implement the Coastal Plants Recovery Plan (USFWS 1998).

Refuge staff will maintain and restore ~180 acres of coniferous dune forest habitat on the MDU and LDU restoring coniferous dune forest margins to native coniferous forest communities which will enhance habitat for many special status species.

Dune swales provide valuable habitat for several species of reptiles and amphibians including the northern red-legged frog, a California Species of Special Concern (SSC). Several bird SSC also use dune swale habitat including black-capped chickadee, yellow warbler, and Cooper's hawk. Many mammal species also use this habitat for foraging and cover, as well as for breeding by small mammals.

Dune riparian forest/swamp habitat provides valuable habitat for several species of reptiles and amphibians including the northern red-legged frog, a California Species of Special Concern (SSC). Many species of migratory birds use dune riparian/swamp habitat; as well as several SSC bird species including: Vaux's swift, willow flycatcher, yellow-breasted chat, and a CESA listed threatened bird, the bank swallow. The

SSC yellow warbler is a bird that nests in this habitat type. Maintaining and restoring this habitat will contribute to the biological integrity, diversity, and environmental health of these rare dune habitat types. Based on the above analysis, the Service has concluded that, although there may be some short term impacts, in the long term, beneficial effects to special status species are anticipated with Alternative B.

Alternative C: Preferred Alternative

Salmon Creek Delta Restoration

Alternative C would provide the greatest benefit to fish and wildlife, especially listed species, due to the increased restoration and improvement goals over Alternative B. Listed salmonids, tidewater goby, and other estuarine dependent species would likely benefit from the modifications proposed for lower Salmon Creek and the Hookton and White Slough Units. Use of these areas by species that are freshwater marsh dependent will decline.

Under Alternative C, the Refuge would implement all of the Salmon Creek and salt marsh restoration strategies described under Alternative B, and the effects previously described for Alternative B would be expected. In addition, as part of Alternative C, excavation of approximately 500 feet of channel to connect the new channel to off-channel salmonid rearing habitat (in Cattail Creek) and securing large woody debris within Hookton Slough would increase available salmonid rearing and shaded riverine aquatic habitat, which is expected to provide addition beneficial effects to salmonids. Also with Alternative C, the Refuge would coordinate with the North Coast Railroad Authority to open tide gates on the north end of the White Slough Unit. As a result, the Service anticipates increased tidal flow and flushing, which is expected to provide additional beneficial effects (relative to Alternative B) to estuarine dependent species such as tidewater goby.

Salt Marsh Habitat

Within 15 years, the Refuge would manage 313 acres of existing salt marsh and restore 235 acres to native salt marsh communities. Areas that would be restored to salt marsh include: 100 acres on the Table Bluff Unit, 45 acres on the White Slough Unit, and 90 acres on the Hookton Slough Unit. The Refuge would implement all of the salt marsh habitat management strategies described under Alternative B. These additions will provide the greatest direct and indirect benefits to Chinook salmon, tidewater goby, eulachon, longfin smelt, Coho salmon, steelhead trout, and coastal cutthroat trout. Creating more marsh habitat (fresh to salt) will create more rearing area, better water quality, increased forage, and ease the transition from fresh to saltwater for the anadromous species. The complete list of species, including special status species, typically found in this habitat is in Appendix K.

Freshwater and Brackish Marsh

At Hookton Slough Unit, 270 acres will be enhanced and restored creating of a continuum of saltwater to freshwater habitats within 10 years. This restoration will provide the greatest direct and indirect benefits to Chinook salmon, tidewater goby, eulachon, longfin smelt, Coho salmon, steelhead trout, and coastal cutthroat trout. Benefits to other species such as shorebirds and waterfowl will also be realized. Creating more marsh habitat (fresh to salt) will create more rearing area, better water quality, increased forage, and ease the transition from fresh to saltwater for the anadromous species. The complete list of species, including special status species, typically found in this habitat is found in Appendix K.

Dune Habitats (including dune mat/foredune grassland, dune swale, dune riparian/swamp, and coniferous dune forest)

The Refuge would implement the same special status species management actions as described under Alternative B, both on and off Refuge lands. In addition to Alternative B actions, the Service would pursue protection of an additional 22 acres of land currently populated with Humboldt Bay wallflower (wallflower) and beach layia. The Service would also pursue protection of 30 acres, which could be restored to wallflower and layia habitat.

The coniferous dune forest habitat and dune riparian swamp habitat would have the same restoration goal as Alternative B, but the timeline would be reduced from 10 years to 5. Dune riparian forest/swamp habitat provides valuable habitat for several species of reptiles and amphibians including the northern red-legged frog, a California Species of Special Concern (SSC). Many species of migratory birds use dune riparian/swamp habitat; as well as several SSC bird species including: Vaux's swift, willow flycatcher, yellow-breasted

chat, and a CESA listed threatened bird, the bank swallow. The SSC yellow warbler is a bird that nests in this habitat type.

Dune swales provide valuable habitat for several species of reptiles and amphibians including the northern red-legged frog, a SSC. Several bird SSC also use dune swale habitat including black-capped chickadee, yellow warbler, and Cooper's hawk. Many mammal species also use this habitat for foraging and cover, as well as for breeding by small mammals.

Maintaining and restoring this habitat will contribute to the biological integrity, diversity, and environmental health of these rare dune habitat types.

Based on the above analysis, the Service has concluded that short term impacts will be overshadowed by the long term beneficial effects to special status species anticipated with Alternative C.

Cumulative Effects

The incremental contribution of any of the alternatives to the regional cumulative impact on special status species would be less than cumulatively considerable except for cumulatively beneficial effects on the Coho salmon, Chinook salmon, northern California steelhead, tidewater goby, Humboldt Bay wallflower, and beach layia.

Invasive Species

Common to all Alternatives

The effects of controlling and/or reducing invasive species on soils, water quality, plant communities, fish and wildlife, and special status species resources are analyzed in those sections above.

Refuge maintenance activities to control or reduce invasive species include the use of Service-approved pesticides in all alternatives. Pesticide Use Proposals (PUPs) are required for pesticide use on lands owned or managed by the Service. Based on the information on PUPs and the analysis of effects of pesticide use discussed earlier in this chapter under the Soils and Plant Communities sections, the Service has concluded that the use of these PUP-regulated herbicides would result in decreasing the extent (vegetative cover area) of invasive species, which is expected to increase the quality of the habitat on and off the Refuge and, therefore, benefit wildlife and all plant communities on and off of the Refuge for each of the alternatives.

Management of invasive species is expected to improve the quality of all habitat types on and off of the Refuge. Therefore, these management actions are expected to be beneficial to plant communities, fish and wildlife both locally and regionally. More detail about the benefits of improved habitat quality is provided in the sections on Plant Communities and the section on Fish and Wildlife, above.

Alternative A: No Action

Ongoing monitoring and removal of invasive plant species; large-scale eradication experiments on dune swale invasive species; finalizing the Salmon Creek Unit invasive plant management plan; and participating in the local weed management area's coordination group are expected to improve the quality of all habitat types on and off of the Refuge. As a result of invasive species management actions, the Service has concluded that beneficial effects to fish, wildlife and their habitat are anticipated with Alternative A.

Alternative B

In addition to all of the activities in Alternative A, Alternative B includes expansion of the existing program to monitor and remove high priority target invasive species; controlling these high priority target invasive species to a maintenance level of control; and pursuing grant funding for partners program for invasive plant control. As compared to Alterative A, all of the aforementioned activities are expected to provide additional habitat quality improvement on and off of the Refuge. As a result of these additional invasive species management actions, the Service has concluded that Alternative B would provide additional beneficial effects to fish, wildlife and their habitats (as compared to Alternative A).

Alternative C: Preferred Alternative

In addition to all of the measures in Alternatives A and B, Alternative C includes a significant focus on assisting with the eradication of *Spartina densiflora* in the greater Humboldt Bay area; development of a Hazard Analysis and Critical Control Point Plan to prevent establishment of new invasive species; an additional contract for invasive plant control; creation and implementation of an IPM step-down plan for the Refuge; and grant funding for yet another contract for invasive plant removal. As a result of these additional invasive species management actions, the Service has concluded that Alternative C would provide the greatest beneficial effects to fish, wildlife and their habitats (as compared to both Alternatives A and B).

Cumulative Effects

The incremental contribution of any of the alternatives to the regional cumulative impact of invasive species is expected to be less than cumulatively considerable due to the vast extent of invasive species on the north coast, but beneficial overall to native plant communities, fish and wildlife locally and regionally.

Visitor Services

The Refuge would be open to wildlife-dependent recreation (hunting, wildlife observation and photography, environmental education and interpretation). Areas of exclusive use for non-hunting wildlife-dependent recreation users would be provided under each alternative.

Visitor Services – Wildlife-Dependent Observation and Photography, Environmental Education and Interpretation

Alternative A: No Action

Under Alternative A, current management, the Service would maintain current Refuge visitor services and facilities. Wildlife dependent recreation opportunities would continue at current levels, including hunting, wildlife observation, photography, environmental education, interpretation, and volunteer activities. Alternative A provides opportunities for up to 20,000 visits annually. While the opportunities are provided, that does not determine the number of actual visitors that would use the Refuge. The Service expects that visitor use at the Refuge would stay approximately the same as it is now under Alternative A, the No Action Alternative.

Alternative B

Alternative B provides opportunities for up to 30,000 visits annually (up to 10,000 more visits annually than Alternative A). Alternative B would also include construction of an environmental education building large enough for up to 30 people or conversion of the Salmon Creek Unit barn into an environmental/cultural resources education building and provide more accessible trails on the Refuge. Whether the Refuge chooses to construct a new facility or convert the old barn into an environmental education facility and more accessible trails, these would increase visitor *opportunities* at the Refuge. Although more visitor opportunities are provided to the public, it is difficult to estimate how many more visitor trips will actually result from more opportunities being available. A new or remodeled environmental education structure and/or more accessible trails may result in an increase in the number of visitors at the Refuge. These additional facilities may result in visitors choosing the Refuge as their destination rather than another location offering similar opportunities in the Humboldt Bay area. The Service expects that a net increase in visitor use at the Refuge may occur under Alternative B, as compared to the No Action Alternative A.

Alternative C: Preferred Alternative

Alternative C provides opportunities for up to 35,000 visits annually (up to 15,000 more visits annually than Alternative A and up to 5,000 more than Alternative B). Alternative C would also include construction of an environmental education building large enough for up to 30 people or conversion of the Salmon Creek Unit barn into an environmental/cultural resources education building and provide more accessible trails on the Refuge. As described in Alternative B, above, a new or remodeled environmental education structure and/or more accessible trails may result in an increase in the number of visitors at the Refuge. These additional facilities may result in visitors choosing the Refuge as their destination rather than another location offering similar opportunities in the Humboldt Bay area. The Service expects an net increase in visitor use at the Refuge may occur under Alternative C, as compared to the No Action Alternative A.

Visitor Services – Hunting

The Refuge would be open to wildlife-dependent recreation (hunting, wildlife observation and photography, environmental education and interpretation). Areas of exclusive use for hunting and non-hunting wildlife-dependent recreation users would be provided under each alternative.

Common to All Alternatives

Although timing of wildlife observation and photography, environmental education and interpretation activities overlap with hunting activities, they occur in geographically distinct areas on the Refuge. Additionally, hunting and non-hunting recreation are further separated by time of day and seasons. For example, hunting is not allowed during certain hours of the day on hunt days and some days of the week are non-hunt days. See Alternative C, the 2008 Draft Waterfowl Hunt Plan (Appendix C to the CCP) for details about physical distance and time buffers.

Alternative A: No Action

The existing waterfowl, coot and snipe hunting program to accommodate 1,200 hunter day use opportunities per year on Salmon Creek Unit is expected to have no adverse effect on refuge resources, as discussed in the Fish and Wildlife section, above. The modification of the pit blinds to prevent stranding of wildlife is expected to be transparent to hunters and have no effect on hunters or their hunting experience. The increase in law enforcement on the Humboldt Bay NWR through contract or through support from other Service law enforcement staff is expected to improve the organization and implementation of hunt activities and reduce violations, resulting in an improved hunting experience for visitors. The posting of additional boundary signs on the Elkhorn Slough Unit, Jacoby Creek Unit, Table Bluff Unit, Egret Island, Teal Island and Hookton Slough Unit is expected to reduce confusion and access violations, improving the hunting experience for visitors.

Alternative B

Alternative B is the same as Alternative A except that it provides additional undisturbed area for wildlife and reduced potential for hunter/non-hunter conflicts by closing Teal Island and Hookton Slough areas to overwater hunting. Alternative B has a small net decrease in hunting area as compared to the No Action Alternative A.

Alternative C: Preferred Alternative

Alternative C is the same as Alternative A except that it implements the 2008 Draft Waterfowl Hunt Plan (Appendix C to the CCP), which opens limited areas of the Ma-le'l Dunes Unit to waterfowl, coot, and snipe hunting and retrieval and increases the youth-only hunt days by 2 days per year on the Salmon Creek Unit. Alternative B has a small net increase in hunting area as compared to the No Action Alternative A.

Cultural Resources

Preserving the culture and history of the nation's past are the goals of regulations that include the National Historic Preservation Act (NHPA), Antiquities Act of 1906, Archeological Resource Protection Act of 1979, and Historic Sites Act of 1935. The NHPA regulations (Title 36 Code of Federal Regulations Section 800 [36 CFR 800]) require that Federal agencies seek information, as appropriate, from the State Historic Preservation Officer (SHPO), the Advisory Council on Historic Preservation (ACHP), Indian tribes, and other individuals and organizations likely to have knowledge of, or concerns with, historic properties in the potentially affected area. These organizations and individuals are integral in identifying issues related to the proposed project's potential effects on historic properties. Similar State regulations protect archeological, paleontological, and historical sites and specifically provide for identification. Cultural resources defined within the framework of these regulations include archeological sites, historic sites, and traditional cultural properties associated with the values of Native Americans and other cultural groups.

Actions that physically disturb a site, alter its setting, or introduce elements out of character with the site may constitute an adverse affect. If a site is eligible for inclusion in the National Register of Historic Places (National Register), any type of physical damage results in a permanent loss of information that reduces the understanding of the site's contribution to the past.

Current records identify 44 cultural resource sites on and immediately adjacent to Humboldt Bay NWR. The sites have been documented at various levels of detail by a number of archaeologists and historians over the decades. None of the sites have been specifically relocated or inventoried for the CCP. Site boundaries and land status haven not been confirmed. Nevertheless the existing records indicate that cultural resources occur on the uplands and at high tide shoreline locations on the refuge. The sites include prehistoric and historic Native American villages, fishing sites, and other resource collection and processing locations. The recorded sites also include historic American logging, ranching, fishing, and related industrial residential and recreational locations.

Only 10 percent of the Humboldt Bay NWR has been systematically surveyed for the presence of cultural resources. Most of the known and recorded cultural resource sites owe their documentation to a specific field investigation designed to find cultural resources. It is reasonable to assume that future surveys for cultural resources will locate and document previously undocumented prehistoric and historic cultural sites.

Common to all Alternatives

The Refuge will comply with all applicable regulations and statutes regarding cultural resources. In consultation with the SHPO and the Tribal Historic Preservation Officer (if applicable), the Service will evaluate the eligibility of cultural resources, traditional cultural properties and unique archeological resources on the Refuge.

The process of identifying and mitigating potential adverse effects to cultural resources listed or eligible to be listed on the National Register of Historic Places is found in 36CFR800. As individual projects generated by the CCP come forward, the Service will exercise Section 106 of the National Historic Preservation Act (NHPA) including consultation with the State Historic Preservation Office (SHPO) and the pertinent Tribes, in accordance with the programmatic agreement with the SHPO and the Service.

Alternative A: No Action

Alternative A includes continuing to manage and conserve Humboldt Bay NWR cultural resources on a project-by-project basis in coordination with the Service's Regional 1 Archaeologist. There would be no change in effects on cultural resources. Under the No Action alternative, the Service would continue to exercise Section 106 of the NHPA to eliminate or minimize adverse effects to cultural resources as it presently does.

Alternative B

Alternative B includes implementing a cultural resources management capability at Humboldt Bay NWR to respond to basic compliance requirements by greater use of contractors or an increase in Refuge staff capability. Alternative B proposed the construction of an environmental/cultural resources education building or converting the Salmon Creek Unit barn into an environmental cultural resources education building. Construction of a new building or modification or demolition of existing old structures on the Salmon Creek and Lanphere Dunes Unit would be a Federal undertaking that requires compliance with Section 106 of the NHPA. Potential adverse effects to cultural resources will be fully determined when specific and detailed project construction plans are available. The Service will exercise Section 106 of the National Historic Preservation Act including consultation with the State Historic Preservation Office and the pertinent Tribes to determine if the undertaking will have an affect on historic properties eligible for inclusion in the National Register of Historic Places. If so, the Service will take measures to avoid, eliminate, or minimize adverse effects.

Alternative C: Preferred Alternative

The effects of Alternative C on cultural resources are the same as those described for Alternative B.

Cumulative Effects

The overall cumulative effect of Alternative B or Alternative C is to increase protection, enhancement, and interpretation of cultural resources on the Humboldt Bay NWR.

Effects on the Social and Economic Environment

This section discusses the direct and indirect economic effects on the regional economy of implementing the various alternatives presented for the Humboldt Bay NWR. Economic or social changes resulting from an action are considered to produce significant effects if the changes result in a substantial adverse physical change in the environment.

Common to All Alternatives

Aleutian cackling goose (ACG) use in Humboldt County has increased to the point where local ranchers are suffering losses of forage consumed by geese and therefore unavailable to livestock (Nelson pers. comm.) (Mini, 2005). The exact amount of financial loss by local ranchers has not been well quantified, but a current (2008) study is seeking to do so (Nelson pers. Comm.).

The action Alternatives B and C both provide increased opportunities for visits to the Refuge annually and may increase visits to the Refuge. If an increase in visits to the Refuge occurs or if there is a net increase in visitors to the area, this could benefit the local economy and local employment if visitors utilize local businesses such as gas stations, markets, and restaurants. Additionally, the increased visitation provides an opportunity for public education, which can foster value for these native habitats. None of the alternatives would result in any direct or indirect adverse physical change in the environment.

Cumulative Effects

Under Alternatives B and C, less than 2 percent of the Refuge's fee title lands that are currently goose habitat are proposed to be restored to other habitat types. This reduction is relatively small as compared to the entire acreage of goose habitat in the area. Improved management of existing pastures should offset this small reduction in ACG habitat. The incremental contribution of any of the alternatives to the cumulative regional impact on the social and economic environment is expected to be less than cumulatively considerable.

Irreversible and Irretrievable Commitment of Resources

NEPA Section 102(C)(v) (CEQ Regulations Part 1502.16) requires Federal agencies to consider any irreversible and irretrievable commitments of resources with would be involved in the proposed action should it be implemented.

Alternative B includes the proposed construction of an environmental education structure near the Headquarters. Alternatives B and C includes a program-level feature that would involve realignment of the Salmon Creek channel. These construction activities would involve the consumption of nonrenewable natural resource such as soil, cement, and petroleum for fuel. The resources used in facilities construction and site preparation, transportation of construction materials, excavation, and disposal of excess excavated materials (unsuitable for fill), would be permanently committed to the project.

Relationship Between Short-term Uses of the Environment and Maintenance and Enhancement of Long-term Productivity

NEPA Section 102(C)(iv) (CEQ Regulations Part 1502.16) requires Federal agencies to disclose the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity. The Service expects that the proposed alternatives would lead to long-term productivity through the life of the CCP (15 years). This discussion focuses on the tradeoffs between short-term environmental costs and long-term environmental benefits.

Any adverse effects on or near the Refuge due to construction are expected to be temporary, short-term (during construction), and localized. The National Wildlife Refuge System (NWR) is the only network of Federal lands dedicated specifically to wildlife conservation. Refuges support more than 700 types of birds, 220 different mammals, 250 reptiles, and more than 200 kinds of fish. The Humboldt Bay NWR Complex was created and authorized by Congress for use as sanctuary for migratory birds; as waterfowl production

areas; for the development, advancement, management, and resources, for (1) incidental fish and wildlife-oriented recreation, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species under FESA. For more information on Refuge purposes, please refer to that section in Chapter 1 of the CCP. 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" (1997 Improvement Act). The long-term environmental benefits of the action alternatives to the NWR System are expected to outweigh the short-term environmental costs at the Refuge.

Indian Trusts Assets

Indian trust assets (ITAs) are legal interests in assets that are held in trust by the United States Government for Federally recognized Indian tribes or individuals. The trust relationship usually stems from a treaty, Executive Order, or act of Congress. The Secretary of the Interior is the trustee for the United States on behalf of federally recognized Indian tribes. "Assets" are anything owned that holds monetary value. "Legal interests" means there is a property interest for which there is a legal remedy, such a compensation or injunction, if there is improper interference. Assets can be real property, physical assets, or intangible property rights, such as a lease, or right to use something. ITAs can not be sold, leased or otherwise alienated without the United States' approval. Trust assets may include lands, minerals, and natural resources, as well as hunting, fishing, and water rights. Indian reservations, Rancherias, and public domain allotments are examples of lands that are often considered trust assets. In some cases, ITAs assets may be located off trust land.

The Service shares the Indian trust responsibility with all other agencies of the Executive Branch to protect and maintain ITAs reserved by or granted to Indian tribes, or Indian individuals by treaty, statute, or Executive Order.

There are no tribes possessing legal property interests held in trust by the United States in the lands or natural resources related to the alternatives.

The Table Bluff Rancheria is approximately 0.5 mile to the west of the Hookton Slough Unit of the Refuge. The Refuge is at a lower elevation than the Table Bluff Rancheria. The Rohnerville Rancheria is approximately 1.25 miles to the east of the Hookton Slough Unit of the Refuge. Both Rancherias are higher in elevation than the Refuge lands. The Rancherias are separated from the Refuge by rolling, hilly terrain; Refuge lands do not drain onto the Rancherias. Because the Service will continue to comply with the Native American Policy, the Service has concluded that none of the alternatives would adversely affect the Table Bluff Rancheria or the Rohnerville Rancheria, and anticipates no adverse effects to ITAs with any of the alternatives.

Environmental Justice

No minority and low-income populations or communities would be disproportionately affected with any of the alternatives. The Service has concluded that no disproportionately high and no adverse human health or environmental effects would result from any of the alternatives.

Growth-Inducing Impacts

None of the alternatives would affect human settlement or development. Therefore, the Service has concluded that no growth-inducing impacts are expected to result from .

Related Projects, Programs, Environmental Assessments

A related project, mentioned in the body of this EA, is the 1992 Humboldt Bay National Wildlife Refuge, Final Environmental Assessment for Habitat Restoration and Enhancement, June 1992. This document was prepared by the Service to address Phase I of the Salmon Creek Restoration plan.
In addition, the Service continues to consult with the NOAA's National Marine Fisheries Service (NOAA Fisheries) on the proposed Phase II of the Salmon Creek Restoration plan under Section 7 of the Federal ESA, as amended.

Consultation and Coordination

The Humboldt Bay NWR has conducted informal consultation with the Arcata Fish and Wildlife Office of the Service and NOAA Fisheries under section 7 of the Federal ESA, as amended, as well as the CDFG. In compliance with section 7 of the Federal ESA, as amended, the Service will request formal consultation with NOAA Fisheries regarding listed species under their jurisdiction. See also the Special Status Species section of this EA.

CASTLE ROCK NATIONAL WILDLIFE REFUGE

Castle Rock NWR Wildlife

Common to All Alternatives

Refuge staff would continue to collaborate with partners such as the National Oceanic and Atmospheric Administration, Humboldt State University, and the Arcata Fish and Wildlife Office to continue photographic surveys of birds and marine mammals utilizing Castle Rock NWR habitat. Surveys would continue to be conducted both aerially and by remote camera to create population estimates of wildlife using Castle Rock NWR habitat.

Due to the sensitivity of wildlife and their habitat on Castle Rock NWR, disturbance is required to be kept to a minimum for any action performed by Refuge staff on Castle Rock NWR. However, visitation to the island for any purpose is highly likely to cause at least minimal disturbance to some wildlife. This disturbance can be greatly mitigated by method and timing (date and time of day) of access, and it is the requirement for any Refuge (approved) actions to factor these considerations in to any planned work. Both aerial and boat survey work can also cause disturbance, but again also be mitigated by appropriate survey distances.

Alternative A: No Action

Additional surveys for terrestrial plants and wildlife at Castle Rock NWR, beyond birds and marine mammals would be conducted every 5 years outside any seabird and pinniped breeding seasons. Surveys will likely be conducted remotely. All personnel that access the island will be well trained wildlife biologists briefed on the impacts they could make if they deviate from the survey protocol. The Service has concluded that no adverse effect to terrestrial plants and wildlife, beyond birds and marine mammals are expected,.

Alternative B

Under Alternative B, habitat management at Castle Rock NWR would be the same as Alternative A. The Service has concluded that potentially adverse effects to wildlife would be minimal.

Alternative C: Preferred Alternative

The Castle Rock NWR would be recommended for wilderness designation. This designation should not change the way the island is managed, as intrusion is already and would continue to be minimized. Therefore, the Service has concluded that potentially adverse effects to wildlife are and would continue to remain minimal.

Castle Rock NWR Special Status Species

Common to All Alternatives

The following species special status species are found at Castle Rock NWR: rhinoceros auklet, tufted puffin, double-crested cormorant, fork-tailed storm-petrel, brown pelican, and Steller (northern) sea-lion.

Due to the remoteness and the conservative approach of Refuge management in all the alternatives, special status species using Castle Rock NWR would be protected from disturbance. Any attempt to land on Castle Rock NWR by Refuge staff would be timed to reduce adverse effects to special status species and shorebirds. Work performed by Refuge staff is designed to benefit the species that inhabit the island. All personnel accessing the island are trained in methods to reduce and minimize disturbance to the habitat and wildlife.

Environmental Assessment References

Airola, D.A., ed. 1980. California wildlife habitat relationships program: Northeast Interior Zone. Vol III. Birds. U.S. Dep. Agric., For. Serv., Lassen Natl. For., Susanville. 590pp.

Brown, S., C. Hickey, B. Harrington, and R. Gill, eds. 2001. The U.S. Shorebird Conservation Plan, 2nd ed. Manomet Center for Conservation Sciences, Manomet, MA.

Bartelt, G.A. 1987. Effects of disturbance and hunting on the behavior of Canada goose family groups in east central Wisconsin. J. Wildl. Manage. 51:517-522.

California Department of Fish and Game. 2006. Report of the 2006 Game Take Hunter Survey. Sacramento, CA. 20 pp.

California Department of Fish and Game (CDFG). 2007. California Wildlife: Conservation Challenges (California Wildlife Action Plan). http://www.dfg.ca.gov/habitats/WDP/report.html

Cole, D.N., and R.L. Knight. 1990. Impacts of recreation on biodiversity in wilderness. Utah State University, Logan, Utah.

Cronan, J.M. 1957. Food and feeding habits of the scaups in Connecticut waters. Auk 74(4):459-468.

DeLong, A. 2002. Managing Visitor Use & Disturbance of Waterbirds. A Literature Review of Impacts and Mitigation Measures.

Feng, J.C., D.G. Thompson, and P.E. Reynolds. 1990. Fate of glyphosate in a Canadian forest watershed: 1. Aquatic residues and off target deposit assessment. Journal of Agricultural Food Chemistry 38: 1110-1118.

Folmar, L.C., H.O. Sanders, and A.M. Julin. 1979. Toxicity of the herbicide glyphosate and several of its formulations to fish and aquatic invertebrates. Archives of Environmental Contamination and Toxicology 8: 269-278.

Forest Service (1984). Pesticide Background Statements, Vol. I Herbicides. United States Dept. of Agriculture, Agriculture Handbook No. 633.

Fox, A.D., and J. Madsen. 1997. Behavioral and distributional effects of hunting disturbance on waterbirds in Europe: implications for refuge design. J. Appl. Ecol. 34:1-13.

Havera, S.P., L.R. Boens, M.M. Georgi, and R.T. Shealy. 1992. Human disturbance of waterfowl on Keokuk Pool, Mississippi River. Wildl. Soc. Bull. 20:290-298.

Heitmeyer, ME., and D. G. Raveling. 1988. Winter resource use by three species of dabbling ducks in California. Dept. Wildlife and Fisheries Biology, Univ. of Calif., Davis. Final Report to Delta Waterfowl and Wetlands Research Center, Portage La Prairie, Manitoba, Canada. 200pp.

Humboldt Bay Watershed Advisory Committee and The Natural Resources Services Division of Redwood Community Action Agency (HBWAC, RCAA). 2005. Humboldt Bay Watershed Salmon and Steelhead Conservation Plan. Prepared for the California Department of Fish and Game and the California Coastal Commission.

Madsen, J. 1985. Impact of disturbance on field utilization of pink-footed geese in West Jutland, Denmark. Biol. Conserv. 33:53-63.

Madsen, J. 1995. Impacts of disturbance on migratory waterfowl. Ibis 137:S67-S74.

Moyle, Peter B. 2002. Inland Fishes of California, Revised and Expanded. University of California Press, Berkeley, CA.

North Coast Regional Water Quality Control Board (NCRWQCB). 2007. Water Quality Control Plan for the North Coast Region.

Owens, N.W. 1977. Responses of wintering brant geese to human disturbance. Wildfowl 28:5-14.

Pacific Coast Fish, Wildlife and Wetlands Association (PCFWWA), Michael Love and Associates, Graham Matthews and Associates. 2003. Lower Salmon Creek Delta Salmonid Habitat Enhancement Opportunities. Humboldt Bay National Wildlife Refuge, Humboldt County, CA.

Pacific Flyway Data Book. 2007. Waterfowl Harvest and Status, Hunter Participation and Success in the Pacific Flyway and United States. 121 pp.

Paulus, S.L. 1984. Activity budgets of nonbreeding gadwalls in Louisiana. J. Wildl. Manage. 48:371-380.

Pickart, A.J., and M.G. Barbour. In press. Beach and Dune. In: M. G. Barbour, T. Keeler-Wolf, and A. Schoenherr, eds. Terrestrial Vegetation of California, 3rd edition. Univerisity of Caifornia Press.

Pickart, A.J., and J.O. Sawyer. 1998. Ecology and Restoration of Northern California Coastal Dunes. California Native Plant Society, Sacramento, CA.

Raveling, D.G. 1979. The annual cycle of body composition of Canada geese with special reference to control of reproduction. Auk 96:234-252.

Thayer, G.W., T.A. McTigue, R.J. Salz, D.H. Merkey, F.M. Burrows, and P.F. Gayaldo. 2005. Science-Based Restoration Monitoring of Coastal Habitats. U.S. Department of Commerce, National Oceanic and Atmospheric Administration. Silver Spring, MD.

Thomas, V.G. 1983. Spring migration: the prelude to goose reproduction and a review of its implication. In Fourth Western Hemispheric Waterfowl and Waterbird Symposium, ed., H. Boyd. 73-81. Ottawa, Canada: Canadian Wildlife Service.

U.S. Fish and Wildlife Service. 1992. Humboldt Bay National Wildlife Refuge, Final Environemental Assessment for Habitat Restoration and Enhancement, June 1992.

Williams, W.M., P.W. Holden, D.P. Parsons and M.N. Lorber. Pesticides in Ground Water Data Base: 1988 Interim Report. United States Environmental Protection Agency. Office of Pesticide Programs.

Fox, A.D. and J. Madsen. 1997. Behavioral and distributional effects of hunting disturbance on waterbirds in Europe: implications for refuge design. J. Appl. Ecol. 34:1-13.

Tu, M., C. Hurd, and J.M. Randall. 2001. Weed Control Methods Handbook, The Nature Conservancy. http://tncweeds.ucdavis.edu/products/handbook/methods-handbook.pdf

U.S. Fish and Wildlife Service (USFWS). 1992. Humboldt Bay National Wildlife Refuge, Final Environmental Assessment for Habitat Restoration and Enhancement, June 1992.

U.S. Fish and Wildlife Service (USFWS). 1998. Seven Coastal Plants and the Myrtle's Silverspot Butterfly Recovery Plan. USFWS Region 1, Portland, OR.

U. S. Fish and Wildlife Service (USFWS). 2005. 2005 Pacific Flyway Data Book: Waterfowl Harvest and Status, Hunter Participation and Success, and Certain Hunting Regulations in the Pacific Flyway and United States. Compiled by R.E. Trost and M.S. Drut. U.S. Fish and Wildlife Service, Portland, OR.

U.S. Fish and Wildlife Service (USFWS). 2006. Recovery Plan for the Tidewater Goby (*Eucyclogobius newberryi*). USFWS, Pacific Region, Portland, OR.

White-Robinson, R. 1982. Inland and salt marsh feeding of wintering brant geese in Essex. Wildfowl 33:113-118.

Wolder, M. 1993. Disturbance of wintering northern pintails at Sacramento National Wildlife Refuge, California. M.S. Thesis, Humboldt State Univ., Arcata. 62pp.

World Health Organization. 1984. 2, 4-Dichlorophenoxyacetic acid (2, 4-D), Environmental Health Criteria 29. United Nations Environmental Programme, Geneva. 151pp. http://www.inchem.org/documents/ehc/ehc/ehc29.htm

Personal Communications

Bowers, A. UC Davis Agricultural Extension. Personal Communication to Sandy Osborn, USFWS, August 6, 2008.

McClelland, Marty. McClelland Consulting. Personal Communication to David Bergendorf, USFWS, March 15, 2007.

Nelson, E.T. USFWS. Personal Communication to Sandy Osborn, USFWS, June 2, 2008.

Environmental Assessment Appendices

APPENDIX 1: Conservation Measures

Conservation measures or Best Management Practices (BMPs) are designed to reduce adverse impacts to fish, wildlife, and plant species and their critical habitats. Appropriate BMPs must be executed by all project coordinators. BMPs are listed by main project categories, but in practice overlaps do exist among the categories. Individual BMPs are subject to becoming more stringent or additional BMPs instituted if restoration activities are changed.

General BMPs for all Project Categories:

1. Follow all terms and conditions in regulatory permits and other official project authorizations to eliminate or reduce adverse impacts to any endangered, threatened, or sensitive species or their critical habitats.

2. Complete restoration activities at individual project sites in a timely manner. This will reduce disturbance and/or displacement of fish and wildlife species in the immediate project area.

3. Significant modifications to an approved work plan must be reviewed and approved by appropriate agency personnel and the landowner(s) before the work can be carried out or continued.

4. Unobstructed fish passage must be provided at all times during any restoration activity.

5. Use existing roadways or travel paths for access to project sites.

6. Avoid the use of heavy equipment and techniques that will result in excessive soil disturbances or compaction of soils, especially on steep or unstable slopes.

7. Vehicles and machinery must cross streams at right angles to the main channel whenever possible.

8. Excavation or transport equipment/machinery should be limited in capacity, but sufficiently sized to complete required restoration activities. Equipment and machinery coming in contact with water shall be inspected daily and cleaned of grease, oil, petroleum products or other contaminants.

9. Streams, riparian zones, and wetlands must not be used as staging or refueling areas. Equipment must be stored, serviced, and fueled away from aquatic habitats or other sensitive areas.

10. Native vegetation must be planted on disturbed sites. Native vegetation should be salvaged from areas where ground disturbances will be occurring on projects. Salvaged vegetation should then be replanted after the completion of project activities. The use of nonnative vegetation will be strictly limited and will apply to situations where native vegetation (i.e., grasses) is not commercially available. All nonnative vegetation must be a close subspecies or variety to native species or reproductively altered (i.e., sterilized) to avoid future ecological complications with native species. Vegetative planting techniques must not cause major disturbances to soils and slopes. Hand planting is the preferred technique for all plantings. Plantings must occur during the optimal seasonal growth period for the respective plant species involved. Vegetation growth should also be enhanced by bank sloping/grading, seedbed and site preparations, mulching, or fertilizing.

11. Boulder and rock materials used for restoration projects must come from non-streambed and non-wetland sources. Conifer and hardwood timber stands must not be specifically harvested to supply woody materials for any restoration activity, unless the harvest is part of an approved silvicultural operation. Boulder, rock, and woody materials must be collected during appropriate seasonal periods to reduce soil and slope disturbances.

12. A written contingency plan must be developed for all project sites where hazardous materials (e.g., pesticides, herbicides, petroleum products) will be used or stored. Appropriate materials/supplies (e.g., shovel, disposal containers, absorbent materials, first aid supplies, clean water) must be available on site to cleanup any small scale accidental hazardous spill; this action will protect the environment, project workers, and the public from direct contact with hazardous materials. Hazardous spills must be reported. Emergency response, removal, transport, and disposal of hazardous materials must be done in accordance with the U.S. Environmental Protection Agency. Hazardous materials and petroleum products shall be stored in approved containers or chemical sheds, and be located at least 100 feet from surface water in an area protected from runoff.

13. The evaluation of herbicide, pesticide, and fertilizer use must include the accuracy of applications, effects on target and non-target species, and the potential impacts to aquatic and terrestrial ecosystems. Treatments for the control or removal of invasive plants in riparian/wetland areas must be limited to hand or wick applications by qualified personnel. Apply chemicals during calm, dry weather and maintain unsprayed buffer areas near aquatic habitats and other sensitive areas. Chemical applications must be avoided where seasonal precipitation or excess irrigation water is likely to wash residual toxic substances into waterways. Consider persistence, soil/water mobility, toxicity, and plant uptake when selecting appropriate chemicals. All chemicals should be handled in strict accordance to label specifications. Proper personal protection (e.g., gloves, masks, clothing) must be used by all applicators. Obtain a copy of the material safety data sheet (MSDS) from the chemical manufacturer for detailed information on each chemical to be used. Refer to appropriate federal and state regulations concerning the use of chemicals. Chemicals must only be considered when other treatments would be ineffective or cannot be applied.

14. Sedimentation and erosion controls must be implemented on all project sites where the implementation of restoration activities will result in soil and/or slope disturbances. Soil and slope stabilization control structures/techniques must be bio-engineered to the extent possible. Structures/techniques must be placed and/or anchored appropriately to prevent adverse impacts to down slope habitats. Revegetate disturbed areas with native vegetation as soon as possible. Control structures/techniques may include, but are not limited to, silt fences, hay bale structures, seeding by hand and hydro-seeding, jute mats, and coconut logs. Contact the local state forester, state extension service agent, or Soil and Water Conservation District for information or assistance on control structures/techniques. *NOTE: This requirement refers to all sediment and erosion control measures addressed in the following project categories.*

15. Staging and stockpile areas must be located on or immediately beside the project area whenever possible. Sediment and erosion controls must be implemented around all stockpiled material and disturbed project sites to prevent the introduction of pollutants into water sources. This will reduce the disturbance and displacement potentials to fish and wildlife species in the surrounding areas.

16. Excess excavated materials removed during the completion of a restoration activity must be disposed of properly and/or stabilized to eliminate future environmental problems. Salvage of boulders, rock, and fill material is encouraged for use on nearby roads or other projects. Vegetation not salvaged will be removed to a county approved disposal site or chipped and composted off site to prevent spread of noxious weeds. If specific uses are not available for project spoils, they will be placed in upland areas, and contoured, with the assistance of an environmental engineer, to blend into the surrounding landscape. Under no circumstances will disposal sites be located in riparian, wetland, or floodplain areas unless used for dike construction. Dike construction would take place only to 1) restore historic hydrology when modifications on adjacent ownerships prevent re-contouring or use of other methods to restore the historic physical condition, or 2) prevent flooding of adjacent landowners' properties not involved in the project. Sedimentation and erosion controls must be implemented to prevent adverse impacts to down slope habitats. Disposal sites should be revegetated with native vegetation as soon as possible.

17. Project coordinators must ensure that all waste resulting from the completion of a project is removed and disposed of properly before work crews vacate the project site.

18. Structures containing concrete or wood preservatives must be cured or dried before they are placed in streams, riparian zones, or wetlands. Wet concrete or runoff from cleaning tools that have wet concrete slurry or lye dust must never enter aquatic habitats. Runoff control measures must be employed, such as hay bales and silt fences, until the risk of aquatic contamination has ended.

19. Monitoring is required during project implementation and for at least one year following project completion to ensure that restoration activities implemented at individual project sites are functioning as intended and do not create unintended consequences to fish, wildlife, and plant species and their critical habitats or adversely impact human health and safety. Corrective actions, as appropriate, must be taken for potential or actual problems.

20. Brightly-colored construction fencing shall be installed around isolated special status plants to avoid disturbance.

21. An environmental education program shall be presented to all construction personnel to brief them on the status of the special status species and the penalty for not complying with these requirements.

Instream Habitat Restoration BMPs:

1. Instream restoration activities must occur during appropriate times as determined by the California Department of Fish and Game and comply with National Marine Fisheries Service (NMFS) guidelines for placement of large wood in streams, stream-road crossings, fish passage improvements. .

2. Large woody debris and boulders used for instream structures need to be appropriately sized, anchored, and/or placed to eliminate or reduce the movement of these materials during high flow events. Size standards must be determined by hydrologists, biologists, or other qualified professionals and should be based on individual stream reaches and their associated seasonal discharge rates. Durable wood and rock materials should be used for instream structures.

3. Installed instream or streambank structures altering hydrologic flow regimes must not impact adjacent or down stream properties or manmade structures.

4. Temporary coffer dams built as a part of a project must use materials from non-streambed and non-wetland sources that are free of fines. Upon project completion, coffer dams must be feathered out in the streambed.

5. Adequate fish screening must be installed and maintained to eliminate or reduce fish emigration into water distribution systems as required by the NMFS. All off-channel livestock watering systems must adhere to this requirement.

6. Heavy equipment must have limited access to the streambeds and streambanks. Instream construction activities must be minimized to reduce sedimentation rates, channel instability, and aquatic habitat impacts.

7. Soil and/or slope disturbances along stream channels should be eliminated or reduced wherever possible. Undisturbed vegetated buffer zones must be retained along stream channels to reduce sedimentation rates, channel instability, and aquatic habitat impacts.

Riparian/Wetland and Upland/Forest Restoration BMPs:

1. Bank stabilizing vegetation removed or altered because of restoration activities must be replanted with native vegetation and protected from further disturbance until new growth is well established. Native shrubs and trees should also be included in the reclamation of disturbed sites. Waste organic materials (e.g., discarded lumber, woody vegetation) must not be used to stabilize soils and slopes in disturbed areas. Metal refuse or debris (e.g., petroleum containers, car bodies) must not be used for streambank protection; this violates both state and federal regulations. Also, broken asphalt and tires must not be used due to potential seepage of petroleum and other toxic chemicals. Concrete is not recommended for bank stabilization projects. Do not use instream materials (e.g., stream debris and gravels) to replace or restore eroded streambanks.

Stabilization projects should employ bioengineering methods to the greatest extent possible.

2. Sedimentation and erosion controls must be implemented on site at all times during wetland restoration or creation activities to maintain the water quality of adjacent water sources.

3. Restoration activities that require prescribed burning of slash material or invasive vegetation must be planned and managed to maximize the benefits and reduce the detrimental effects of burns. Slash control and disposal must also be completed in a way that reduces the occurrence of debris from entering stream channels. Reduce the potential for very hot burns to conserve litter layers and eliminate or reduce the development of hydrophobic soil conditions. Develop plans for rapid site revegetation. Always consider nonburning alternatives whenever possible. Fire suppression equipment must always be located at the immediate project site during prescribed burnings.

4. Slash materials should be gathered by hand or with light machinery to reduce soil disturbances and compaction of soils. Avoid accumulating or spreading slash in upland draws, depressions, intermittent streams, and springs. Slash control and disposal activities should be conducted in a way that reduces the occurrence of debris in streams. These practices will eliminate or reduce debris torrents, avalanches, flows, and slides.

5. Use the appropriate timber yarding system during silvicultural operations to eliminate or reduce soil disturbances and compaction of soils.

6. Retain or develop snags on project sites for cavity dependent wildlife species whenever possible.

7. Abandoned and decommissioned roadways must be revegetated. Compacted road surfaces will be tilled to promote vegetation establishment and growth. Ensure that drainage patterns on these roadways will not result in increased sedimentation rates or erosion to down slope habitats. Drainage improvements should be constructed and stabilized before the rainy season. Install water energy dissipators (e.g., water bars and rolling dips) along roadways and on all cross drain outfalls. Do not sidecast excavated road materials, and avoid accumulating or spreading these materials in upland draws, depressions, intermittent streams, and springs. Road entrances closed by tanking or ditching must have the excavated/disturbed areas stabilized as soon as possible.

8. Purchase seedlings from reputable suppliers or growers. Hardwood and conifer seedlings should be stored, handled, and planted properly. Seeds used to grow seedlings should have been collected in an area where the environmental conditions (e.g., elevation and range) closely match those on project sites; refer to a tree seed zone map and ensure that every purchased box or bag of seedlings are clearly marked with the seed zone and elevation. Reduce seedling competition by clearing grasses, forbs, and woody shrubs from around each seedling for a minimum distance of three feet. Employ the proper methods to protect seedlings from animal, insect, and environmental damages. Periodically examine planted seedlings for damages and diseases. Contact your local state forester or extension service agent for additional information or assistance.

9. Retain the appropriate amount of down and decaying woody debris to provide for wildlife habitats and nutrient recycling. Project coordinators should be aware of potential wildfire hazards in project areas because of retained woody debris.

10. Fall trees away from streams, riparian zones, and wetlands whenever possible. Tree falling on steep slopes should not be done or done in an appropriate manner to avoid damage to surrounding vegetation and soils. Employ the proper yarding technique on project sites to eliminate or reduce soil disturbances and compaction of soils.

11. Fence designs (e.g., wire type and wire spacing) and installations should not restrict the movement of any wildlife species; limit the use of woven wire fences whenever possible. The quality and durability of fencing materials must meet or exceed the intended management objectives. Fences must not be constructed in areas where natural barriers restrict livestock movements. Refer to the Bureau of Land Management fencing handbook (BLM 1989) for additional information.

12. Livestock crossings and off-channel livestock watering facilities must not be located in areas where compaction and/or damage may occur to sensitive soils, slopes, or vegetation due to congregating livestock. Livestock fords across streams must be appropriately rocked to stabilize soils/slopes and prevent erosion. Do not use crushed rock to stabilize fords. Fords should be placed on bedrock or stable substrates whenever possible.

13. Silvicultural activities (e.g., herbicide treatment, thinning, and harvesting) should be limited or restricted on steep slopes and highly erodible soils to prevent accelerated soil erosion and increased sedimentation rates.

14. Fill material used on project sites must be from nonstreambed and nonwetland sources that are free of fines. Deposition of materials must not violate state or federal regulations, standards, or guidelines as set forth by local Soil and Water Conservation Districts, U.S. Army Corps of Engineers, or other regulatory agencies.

Fish Passage Improvement BMPs:

1. The dimensions, slopes, jump heights, water depths, and seasonal flows in fishways must be adequate to pass the intended fish species and life stages at critical migration periods. Provide fish resting areas, as necessary, within the fishways, and maintain appropriate entrance flows to attract fish. Restrict fish access to inappropriate areas to prevent fish morbidity and mortality.

2. Culverts and bridges, whether for livestock or vehicle access, must be sized to pass at least a normal seasonal high flow and designed to provide unobstructed fish passage at all times. Bridge abutments must be designed and installed in a way that does not alter stream flows or channel stability. Do not backfill culverts or bridge abutments with vegetation, debris, or mud. Abutments should be properly protected (e.g., rock armored) to prevent future scouring actions and erosion hazards. All culvert passage projects must be consistent with the NMFS "Culvert Passage Guidelines" Bridge designs and installations must conform to all federal and state standards.

3. Installed culverts should be aligned to stream flows and positioned at or below stream grades. Culvert inlets and outfalls should be properly protected (e.g., rock armored) to prevent future scouring actions and erosion hazards. Use appropriate culvert lengths and install culverts at proper slopes (less than 1% slope gradient) to aid fish passage. Install baffles inside culverts, as a last resort necessity, to reduce flow velocities. Open-bottom and arch culverts are the preferred culvert types to be used if existing culverts are to be replaced. A single large culvert is preferred over using several smaller culverts at individual stream crossings.

4. Develop maintenance schedules for culvert and bridge installations to ensure they remain in proper functioning condition. Install trash/debris racks, as necessary, to prevent blockage or damage to these structures. These racks must be installed and maintained in such as manner that fish are easily able to pass through them at any time.

5. Appropriate sediment and erosion controls must be implemented as they apply to specific fish passage structures. Revegetate bare soils with native vegetation as soon as possible to prevent sedimentation and erosion hazards.

6. All fish screening projects must be consistent with the NMFS "Juvenile Fish Screen Criteria," and all intake screening projects must be consistent with NMFS "Pump Intake Screen Guidelines."

7. Fish passage structural designs (i.e., culverts and fishways) must be submitted to the NMFS, through the U.S. Fish and Wildlife Service, to obtain design approvals prior to the installation of the structures.

Air Quality BMPs:

1. All disturbed areas shall be effectively stabilized of dust emissions using water, approved chemical stabilizer/suppressant, tarp or other suitable cover or vegetative ground cover.

2. All land clearing, grubbing, scraping, excavation, land leveling, grading, cut and fill, and demolition activities shall be effectively controlled of fugitive dust emissions by applying water or by pre-soaking.

3. Following the addition of materials to, or the removal of materials from the surface of outdoor storage piles, said piles shall be effectively stabilized of fugitive dust emissions using sufficient water or approved chemical stabilizer/suppressant.

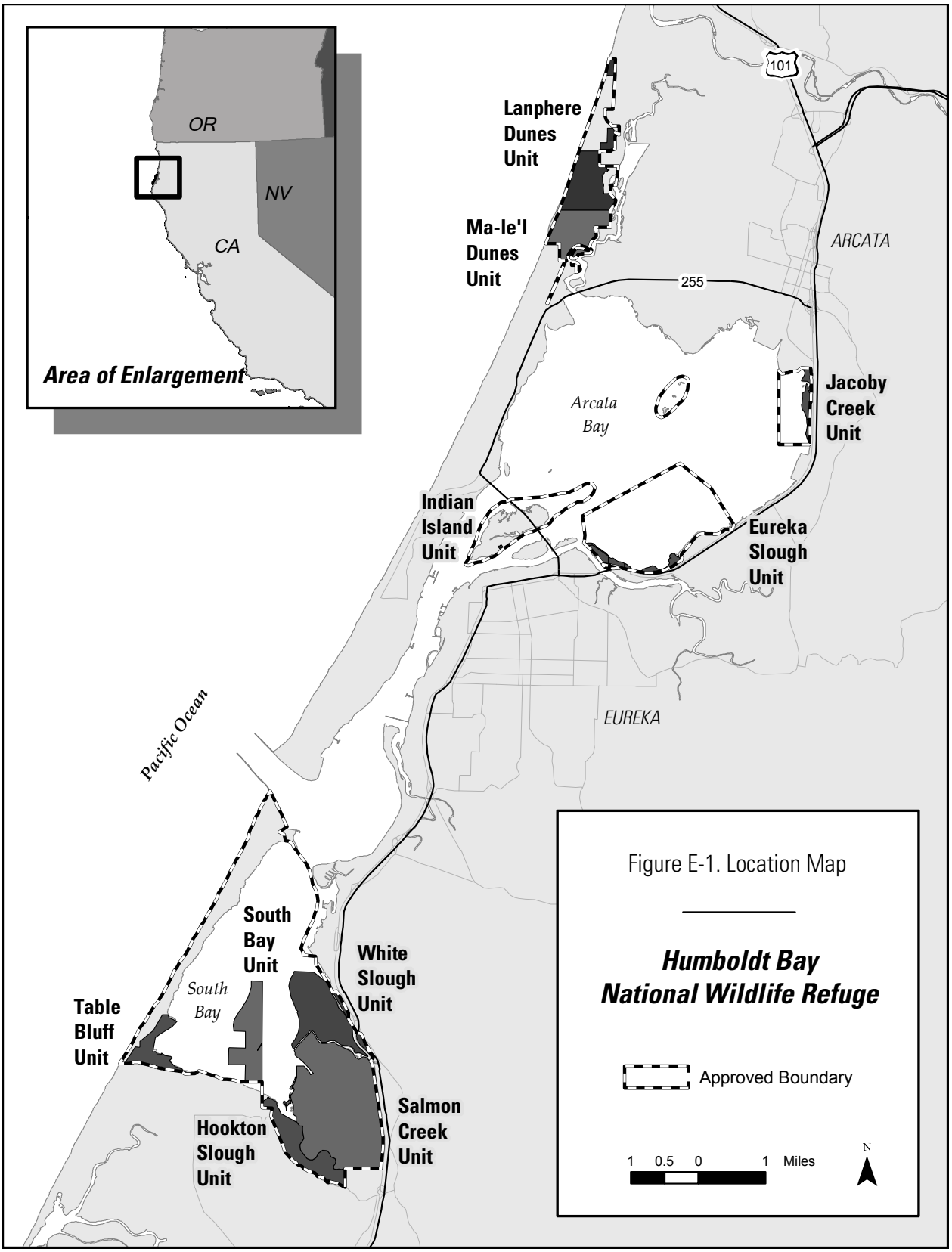

Figure E-1: Location Map.

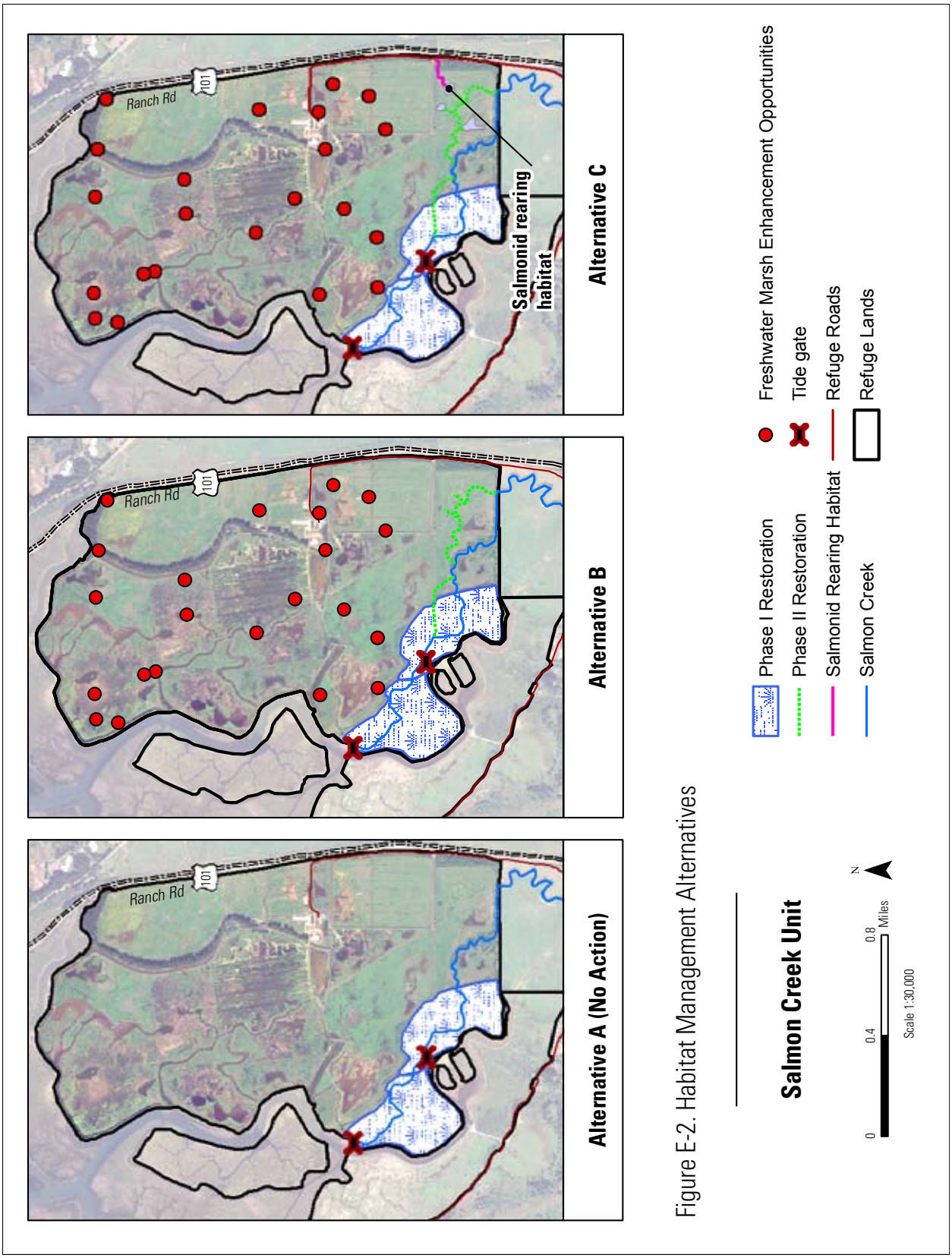

Figure E-2. Habitat Management Alternatives

Figure E-2: Habitat Management Alternatives, Salmon Creek Unit.

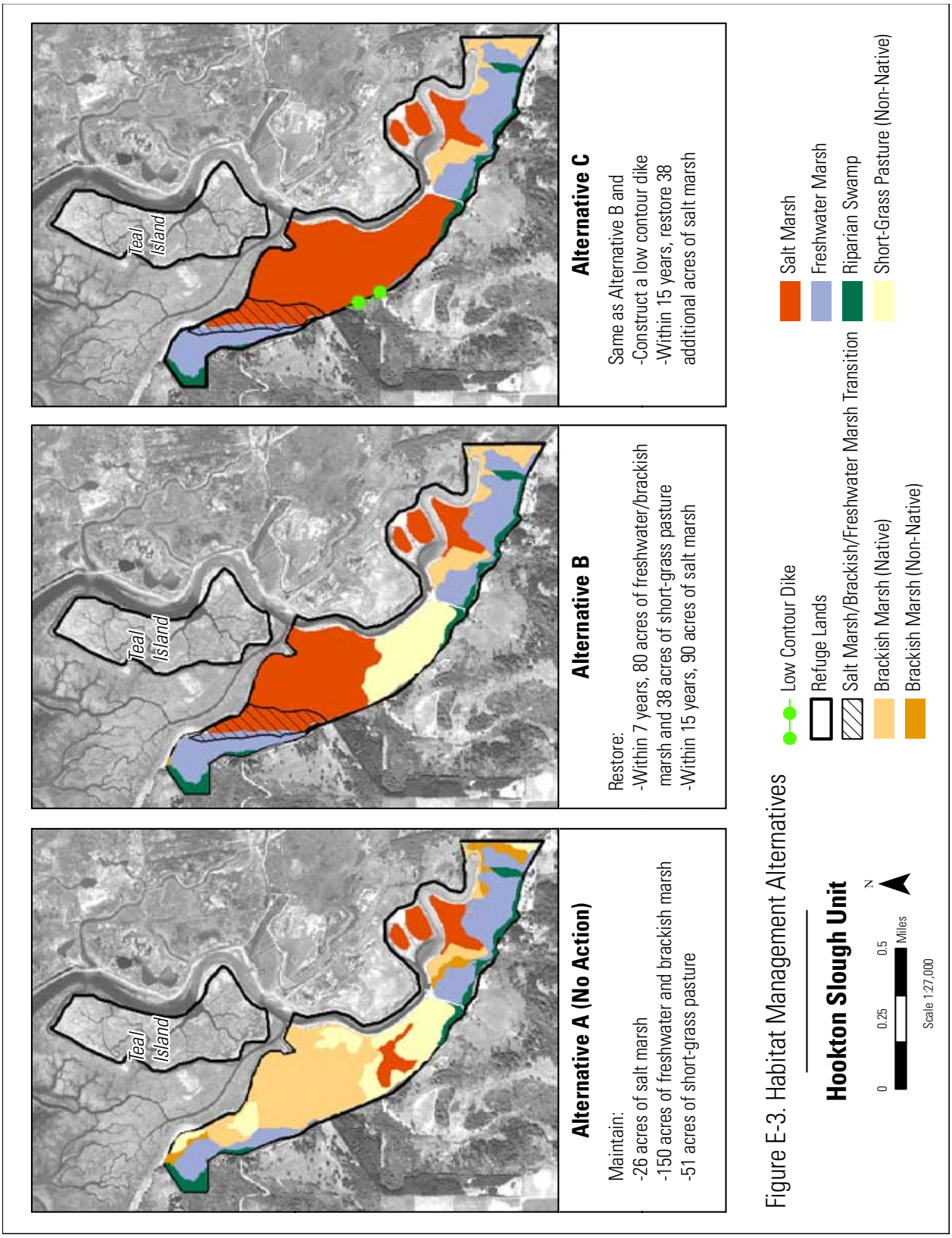

Figure E-3: Habitat Management Alternatives, Hookton Slough Unit.

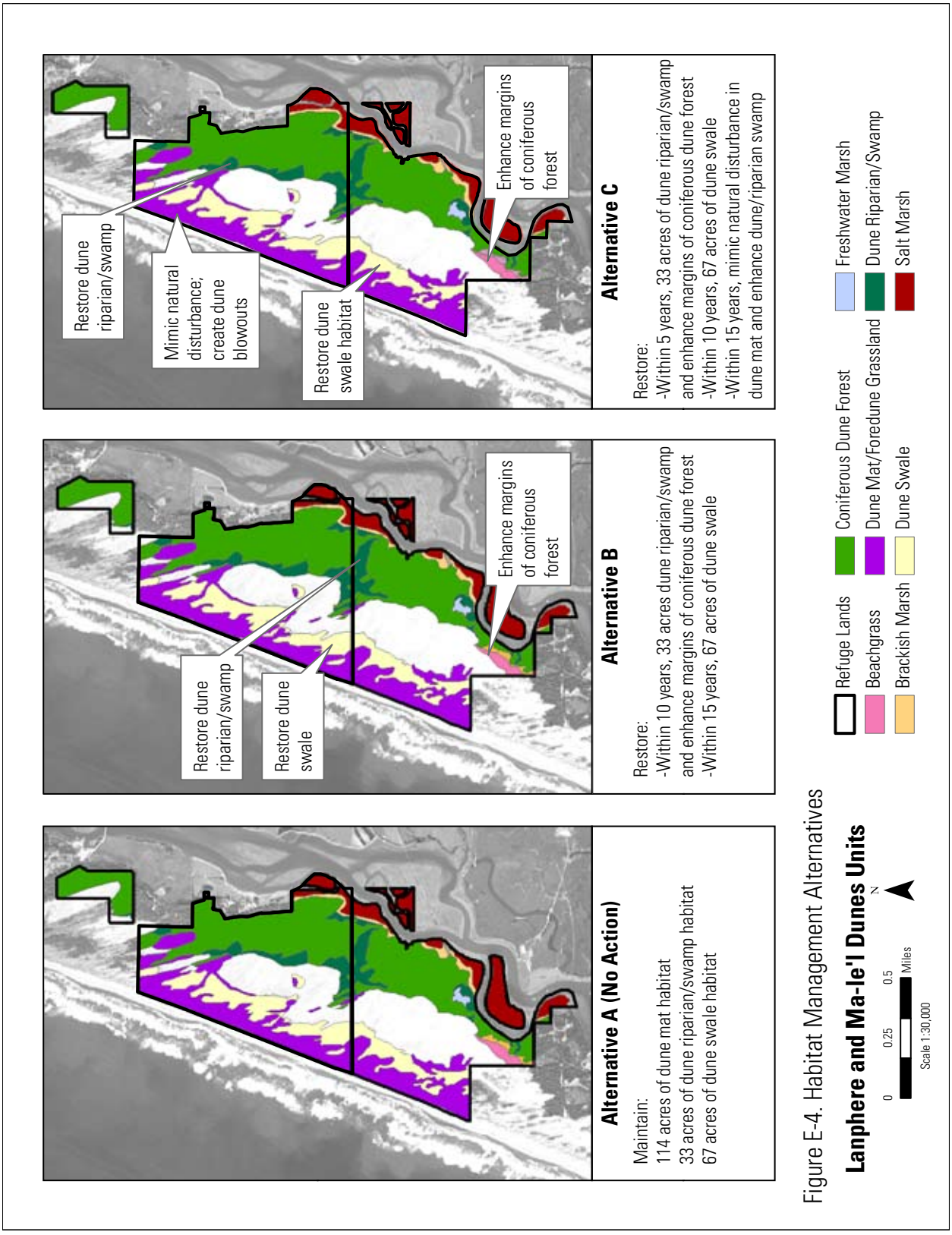

Figure E-4. Habitat Management Alternatives

Lanphere and Ma-le'l Dunes Units

Figure E-4: Habitat Management Alternatives, Lanphere and Ma-le'l Dunes Units.

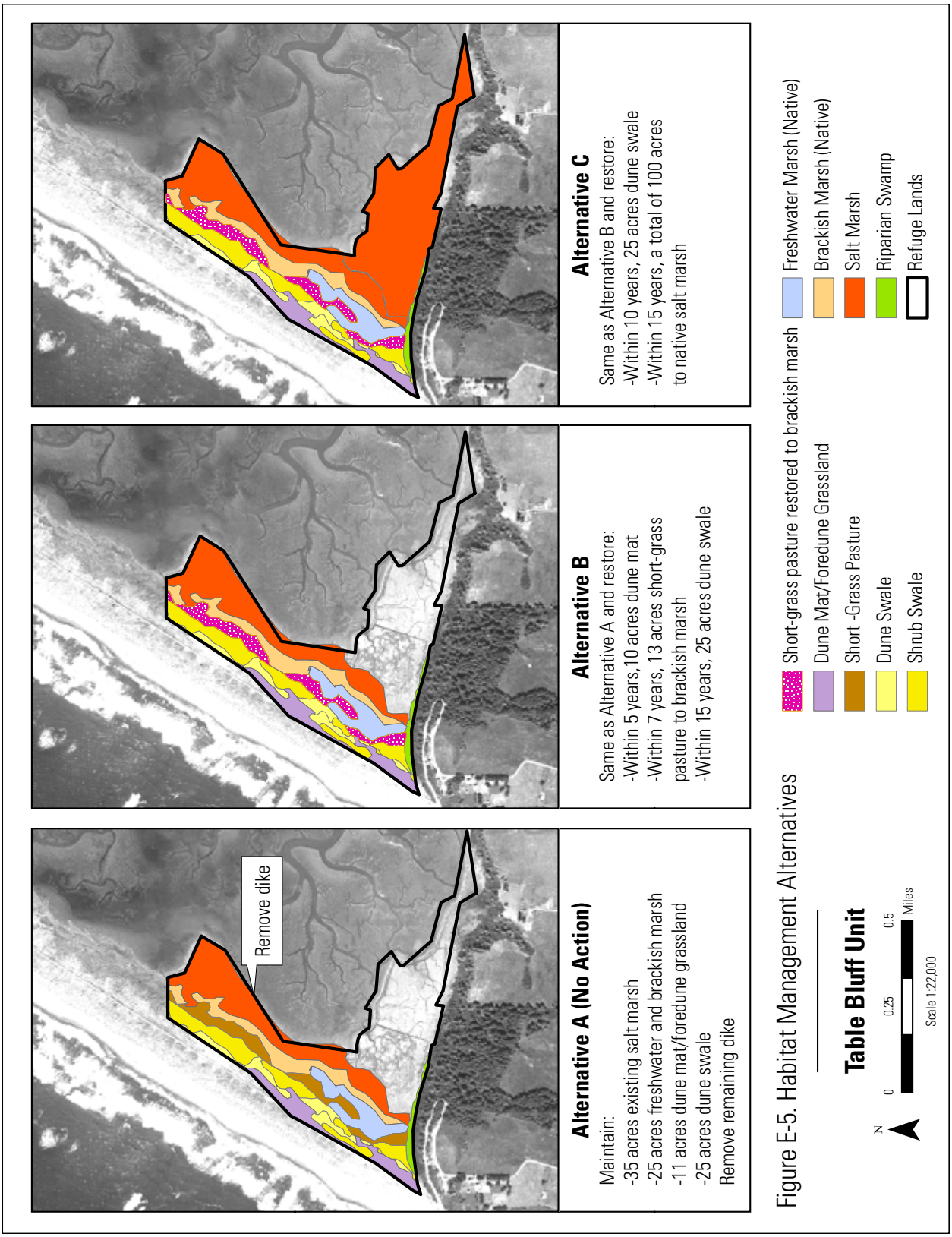

Figure E-5: Habitat Management Alternatives, Table Bluff Unit.

Figure E-6: Habitat Management Alternatives, White Slough Unit.

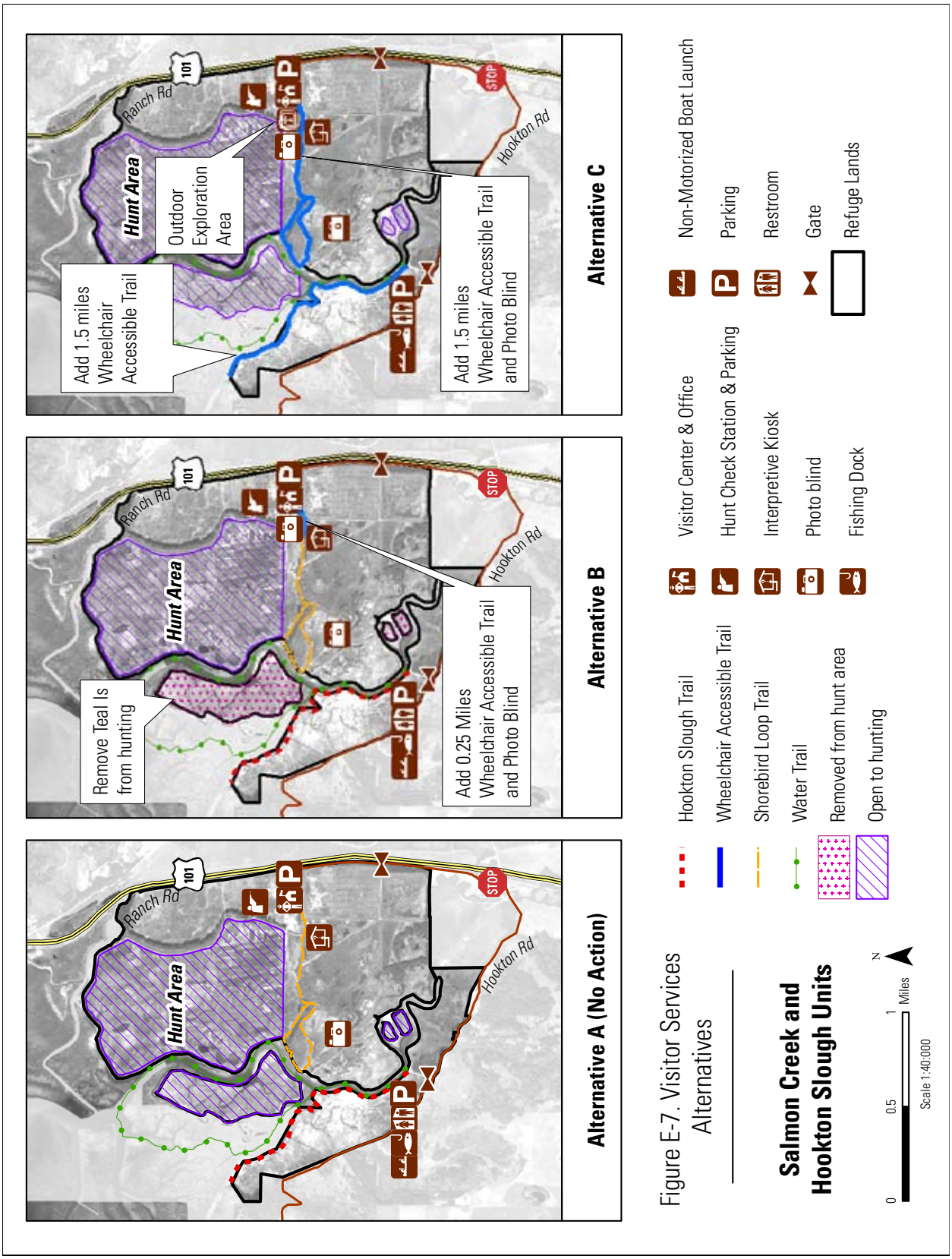

Figure E-7: Visitor Services Alternatives, Salmon Creek and Hookton Slough Units.

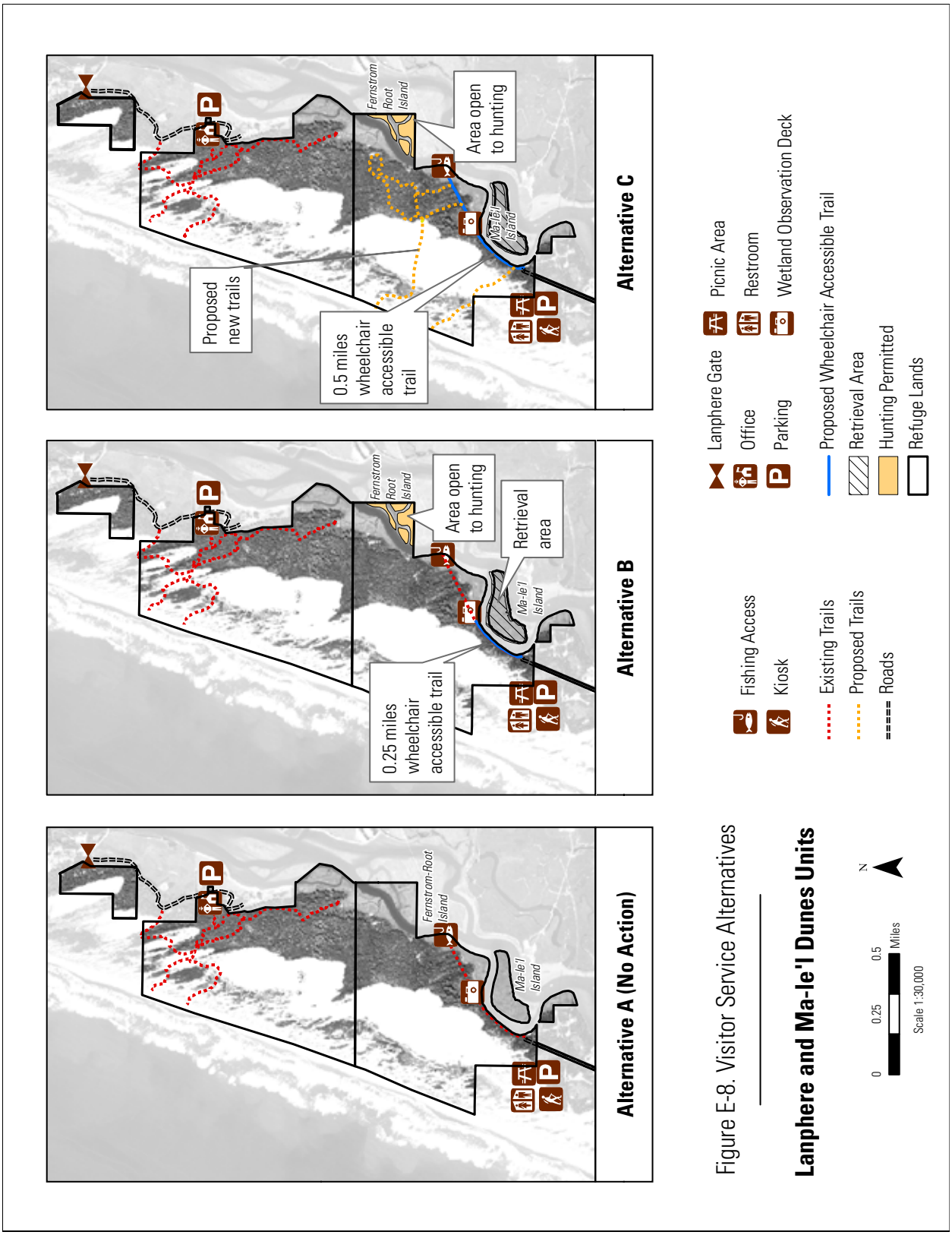

Figure E-8: Visitor Services Alternatives, Lanphere and Ma-le'l Dunes Units.

Appendix F: Compatibility Determinations

Compatibility Determination for Environmental Education and Interpretation for Humboldt Bay NWR

Use: Environmental Education and Interpretation

Refuge Name: Humboldt Bay National Wildlife Refuge, Humboldt Bay National Wildlife Refuge Complex

County and State: Humboldt County, California

Establishing and Acquisition Authority(ies):

Humboldt Bay NWR was established under the authority of The Migratory Bird Conservation Act of 1929, The Migratory Bird Hunting and Conservation Stamp Act of 1934, the Fish and Wildlife Act of 1956, the Refuge Recreation Act of 1962, and The Endangered Species Act of 1973.

Refuge Purpose(s):

According to these authorities, Humboldt Bay NWR's purposes are:

"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. §§ 715d (Migratory Bird Conservation Act)

"... as Waterfowl Production Areas subject to... all of the provisions of such Act [Migratory Bird Conservation Act] ... except the inviolate sanctuary provisions ..." 16 U.S.C. 718(c) (Migratory Bird Hunting and Conservation Stamp Act)

"... for the development, advancement, management, conservation, and protection of fish and wildlife resources ..." 16 U.S.C. §§ 742f(a)(4) and "... 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) (Fish and Wildlife Act of 1956)

"...suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species..." 16 U.S.C. §§ 460k-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 (Refuge Recreation Act [16 U.S.C. §§ 460k-460k-4], as amended)

"... to conserve (A) fish or wildlife which are listed as endangered species or threatened species ....or (B) plants ..." 16 U.S.C. §§ 1534 (Endangered Species Act of 1973)

National Wildlife Refuge System Mission:

"The mission of the 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-ee]).

Description of Use(s):

Environmental education and interpretation are those activities which seek to increase the public's knowledge and understanding of wildlife and its associated ecology and contribute to the conservation of such wildlife. The Humboldt Bay NWR (Refuge) proposes to enhance existing environmental education by strengthening existing partnerships with area schools, universities, conservation groups and the refuge support groups (Friends of Humboldt Bay National Wildlife Refuge and Friends of the Dunes).

The refuge currently offers traditional environmental education activities (teacher-led or staff-led on-site field trips), annual interpretive events, guided natural history walks, etc. The refuge currently provides wildlife-dependent educational opportunities for four school or community groups per month and 20,000 annual visitor opportunities for interpretive experiences on refuge property to foster public awareness and appreciation of wildlife and their habitats around Humboldt Bay. Within 15 years, the refuge expects to provide wildlife-dependent educational opportunities for at least 8 school or community groups per month and 35,000 annual visitor opportunities for interpretive experiences on and off refuge to foster public awareness and appreciation of the natural heritage of the north coast. The current program includes 3 walks monthly at Salmon Creek Unit and 2 walks monthly at Lanphere Dunes Unit. Ma-le'l Dunes Unit is yet to open, but should add at least 1 walk. With the addition over then next 15 years of a 1/2 time FTE, 3.7 miles of accessible trails, the Historic Hunt Cabin and the Children's Outdoor Exploration area, 8 school or community groups receiving wildlife-dependent educational opportunities is reasonable goal.

The refuge Visitor's Center has interpretive panels that provide information on wildlife and their respective habitats. There is also a children's area called the "Fledgling Fort" in the Visitor Center that contains nature-centered activities and a seasonal "Children's Outdoor Exploration Area" for children to explore nature in an unstructured way. Several educational and conservation organizations utilize the refuge for educational purposes. Some of these include the Audubon Society, groups from College of the Redwoods, Humboldt State University, and local elementary and high schools.

A self-guiding interpretive pamphlet is available at the refuge visitor's center that provides historic and natural history information corresponding to numbered locations along the Shorebird Loop Trail on the Salmon Creek Unit.

Availability of Resources:

Presently, there is adequate funding and staff to meet the current needs for the environmental education and interpretation program at the existing visitation rate. The Refuge staff has seen increased demand for environmental education and interpretation experiences. Area schools are requesting hands-on nature activities that emphasize particular topics concerning the environment to provide students with a well rounded Refuge experience. In anticipation of increased use in this area, a part-time permanent Visitor's Service Assistant was funded in 2008. The Refuge will continue to pursue various areas of matching funding for this position in order to make it full-time.

Facilities

Material/Facility Proposed	Explanation of Need	Cost [1] annual cost [2] one time cost
Education materials and supplies	Various materials are required annually to implement existing environmental education programs	$3K[1]
Acquire additional and maintain existing interpretive panels	Acquire additional and Update existing interpretive panels and signs to facilitate education and interpretive programs.	$50K[2]
Complete the "Historic Hunt Cabin"	Will interpret the recent history of the Salmon Creek Ranch, refuge development, and the role waterfowling at the ranch, refuge, and bay played in local conservation efforts.	$100K[2]
Establish outdoor environmental education structure for lab activities	Will allow students/visitors to explore the ecology of the refuge in a lab setting and in inclement weather	$50K[2]
Establish 'Discovery Area' on refuge in accordance w/ Children in Nature Initiative	Allows for a place on the refuge where children can use all their senses to explore nature.	$10K[2]
	Increase accessibility for 6 priority uses under Americans with Disabilities Act	$50 K[2]
Total Construction Cost for Facilities		**$260K**
Annual Cost		**$3K**

Staffing

Position	Involvement	FTE	Annual Cost
Project Leader	General oversight of programs & budget	0.1	$12K
	Periodic on-site oversight, occasional monitoring of program activities	0.2	$20K
Maintenance Worker	Facilities maintenance	0.1	$10K
	Coordinate and provide oversight of environmental education programs and assist in interpretive plan design.	0.5	$20K
Total FTEs and Costs for Staffing		**.8**	**$62K**

Anticipated Impacts of the Use(s):

The use of on-site, hands-on action-oriented activities by groups of up to 50 students and teachers (the maximum group size the Refuge can accommodate to ensure a quality environmental education experience for all students) to accomplish environmental education objectives may impose a short-term, low level impact on the sites used for these activities. These low level impacts may include trampling of vegetation and temporary disturbance to wildlife species in the immediate vicinity. It is not anticipated that such impacts would be permanent or long-lasting because these activities take place on established trails or areas close to the Visitor's Center where wildlife is already somewhat habituated to human activities.

Direct Short-term impacts:

The presence of humans will disturb wildlife causing temporary displacement without long-term effects on individuals or populations. Some species will avoid the areas people frequent, while others will seemingly be unaffected by the presence of humans.

Activities related to environmental education and photography can have negative impacts to wildlife by altering wildlife behavior, reproduction, and distribution. The response of wildlife to human activities includes: site departure (Owen 1973, Burger 1981, Henson and Grant 1991, Klein 1993), use of suboptimal habitat (Erwin 1980, Williams and Forbes 1980), altered behavior (Burger 1981, Morton et al. 1989, Havera et al. 1992, Klein 1993), and increase in energy expenditure (Morton et al. 1989, Belanger and Bedard 1990). McNeil et al. (1992) found that many waterfowl species avoid disturbance by feeding at night instead of during the day. The location of recreational activities impacts species in different ways. Miller et al. (1998) found that nesting success was lower near recreational trails, where human activity was common, than at greater distances from the trails. A number of species have shown greater reactions when pedestrian use occurred off trail (Miller et al. 1998).

For songbirds, Gutzwiller et al. (1997) found that singing behavior of some species was altered with low levels of human intrusion. Pedestrian travel can impact normal behavioral activities, including feeding, reproductive, and social behavior. Studies have shown that ducks and shorebirds are sensitive to pedestrian activity (Burger 1981, 1986). Resident waterbirds tend to be less sensitive to human disturbance than migrants, and migrant ducks are particularly sensitive when they first arrive (Klein 1993). In areas where human activity is common, birds tolerated closer approaches than in areas receiving less activity.

Environmental education activities can affect wildlife resources positively and negatively. A positive effect of public involvement in these priority public uses will be a better appreciation and more complete understanding of the refuge wildlife and habitats. Pedestrian travel has the potential of impacting shorebird, waterfowl, and other migratory bird populations feeding and resting near the trails and on beaches during certain times of the year. Human disturbance to migratory birds has been documented in many studies. However, the overall effects to wildlife should not be significant, because public use is allowed on only a small portion of the Refuge lands.

Public Review and Comment:

Environmental education and interpretation were discussed at two public meetings held in conjunction with the Comprehensive Conservation Plan Process. To initiate the CCP process, a Notice of Intent was published in the Federal Register on January 29, 2007. Written comments were solicited from the public about the refuge's operations including public use programs such as environmental education and interpretation. Three CCP planning updates and one planning workbook were prepared to summarize the progress of the CCP and to discuss issues related t the planning process. This compatibility determination will be submitted for public review and comment as an appendix to the Environmental Assessment for the draft Comprehensive Conservation Plan for the Humboldt Bay National Wildlife Refuge Complex.

Determination (check one below):

___ Use is Not Compatible

__X_ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Activities are held on existing trails, pull-off areas and gardens where human presence is frequent and wildlife are minimally affected by the presence of humans. Periodic opportunistic evaluation of sites, programs and general public use are held to assess if objectives are being met and the resource is not being degraded. If evidence of unacceptable adverse impacts begin to appear, it may be necessary to temporarily close a trail or site.

As the need increases, the refuge will recruit volunteers or interns to assist with providing environmental education and interpretation tours. Prospective groups interested in guided wildlife-dependent environmental education at the refuge are currently required to submit a field trip application, available in the refuge visitor center, by fax, and on the refuge website. Applications are reviewed and trips developed based on conversation between Visitor Services staff and applicants to provide a detailed trip plan to maximize the effectiveness and enjoyment of each trip for user groups. Staff discusses trail etiquette, including ways to reduce wildlife disturbance, with teachers during the pre-trip planning conversations and with students upon their arrival at the Refuge during their welcome session.

Sign replacement and installation along public trails and access points will be prioritized to prevent visitors from entering sensitive areas.

Justification:

The National Wildlife Improvement Act of 1997 (Pub. L. 105-57) identifies six legitimate and appropriate uses of wildlife refuges: hunting, fishing, wildlife observation and photography, and environmental education and interpretation. Where these uses have been determined compatible, they are to receive enhanced consideration over other uses in planning and management.

These uses have been determined compatible because environmental education and interpretation will not materially interfere with or detract from unit purposes. The continuation of these programs will support the refuge goal of fostering a broader understanding of the value of wildlife conservation. The level of use for environmental education and interpretation is moderate. The associated disturbance to wildlife is temporary and minor. Under those conditions, the staff does not expect them to materially interfere with or detract from the mission of the System or diminish the purposes for which the refuge was established; nor do we expect them to cause significant adverse effects on refuge resources or cause undue administrative burden.

Mandatory Re-Evaluation Date: (provide month and year for "allowed" uses only)

_____X_____Mandatory 15-year reevaluation date (for wildlife-dependent public uses)

_____Mandatory 10-year reevaluation date (for all uses other than wildlife-dependent public uses)

NEPA Compliance for Refuge Use Decision: (check one below)

___Categorical Exclusion without Environmental Action Statement

_ _ Categorical Exclusion and Environmental Action Statement

___Environmental Assessment and Finding of No Significant Impact

___Environmental Impact Statement and Record of Decision

References Cited:

Belanger, L., and J. Bedard. 1990. Energetic cost of man-induced disturbance to staging snow geese. Journal of Wildlife Management 54:36.

Burger, J. 1981. The effect of human activity on birds at a coastal bay. Biological Conservation. 21:231-241.

Burger, J. 1986. The effect of human activity on shorebirds in two coastal bays in northeastern United States. Environmental Conservation. 13:123-130.

Erwin, R. M. 1980. Breeding habitat by colonially nesting water birds in 2 mid-Atlantic U.S. regions under different regimes of human disturbance. Biological Conservation. 18:39-51.

Gutzwiller, K.J., R.T. Wiedenmann, and K.L. Clements. 1997. Does human intrusion alter the Seasonal timing of avian song during breeding periods? Auk. 114:55-65.

Havera, S.P., L.R. Boens, M.M. Georgi, and R.T. Shealy. 1992. Human disturbance of waterfowl on Keokuk Pool, Mississippi River. Wildlife Society Bulletin. 20:290-298.

Henson, P.T., and A. Grant. 1991. The effects of human disturbance on trumpeter swan breeding behavior. Wildlife Society Bulletin. 19:248-257.

Klein, M.L. 1993. Waterbird behavioral responses to human disturbances. Wildlife Society Bulletin. 21:31-39.

McNeil, R., P. Drapeau, J.D. Goss-Custard. 1992. The occurrence and adaptive significance of nocturnal habitats in waterfowl. Biological Review. 67:381-419.

Miller, S.G., R.L. Knight, and C.K. Miller. 1998. Influence of recreational trails on breeding bird communities. Ecological Applications. 8(1) 162-169.

Morton, J.M., A.C. Fowler, and R.L. Kirkpatrick. 1989. Time and energy budgets of American black ducks in winter. Journal of Wildlife Management. 53:401-410.

Owen, M. 1973. The management of grassland areas for wintering geese. Wildfowl. 24:123-130.

Williams, G.J., and E. Forbes. 1980. The habitat and dietary preferences of dark-bellied Brant geese and widgeon in relation to agricultural management. Wildfowl. 31:151-157.

Refuge Determination:

Prepared by: _____ _____
(Signature) (Date)

Refuge Manager/
Project Leader
Approval: _____ _____
(Signature) (Date)

Concurrence:

Refuge Supervisor: _____ _____
(Signature) (Date)

Assistant Regional
Director - Refuges: _____ _____
(Signature) (Date)

Compatibility Determination for Wildlife Observation and Photography for Humboldt Bay NWR

Use: Wildlife Observation and Photography

Refuge Name: Humboldt Bay National Wildlife Refuge, Humboldt Bay National Wildlife Refuge Complex

County and State: Humboldt County, California.

Establishing and Acquisition Authority(ies):

Humboldt Bay NWR was established under the authority of The Migratory Bird Conservation Act of 1929, The Migratory Bird Hunting and Conservation Stamp Act of 1934, the Fish and Wildlife Act of 1956, the Refuge Recreation Act of 1962, and The Endangered Species Act of 1973.

Refuge Purpose(s):

According to these authorities, Humboldt Bay NWR's purposes are:

"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. §§ 715d (Migratory Bird Conservation Act)

"... as Waterfowl Production Areas subject to... all of the provisions of such Act [Migratory Bird Conservation Act] ... except the inviolate sanctuary provisions ..." 16 U.S.C. 718(c) (Migratory Bird Hunting and Conservation Stamp Act)

"... for the development, advancement, management, conservation, and protection of fish and wildlife resources ..." 16 U.S.C. §§ 742f(a)(4) and "... 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) (Fish and Wildlife Act of 1956)

"...suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species..." 16 U.S.C. §§ 460k-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 (Refuge Recreation Act [16 U.S.C. §§ 460k-460k-4], as amended)

"... to conserve (A) fish or wildlife which are listed as endangered species or threatened species ....or (B) plants ..." 16 U.S.C. §§ 1534 (Endangered Species Act of 1973)

National Wildlife Refuge System Mission (System):

"The mission of the 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-ee]).

Description of Use(s):

The Humboldt Bay National Wildlife Refuge (Refuge) would continue to provide opportunities for wildlife observation and photography, two of the six priority uses of the National Wildlife Refuge System. If found

compatible, priority uses are to receive enhanced consideration over other general public uses. (16 U.S. C. 668dd-668ee, as amended by Pub.L. 105-57; 111 Stat 1252).

Wildlife observation and photography would be limited to the established trail systems of the Humboldt Bay NWR, and the Visitor Center, photo blind, the Children's Outdoor Exploration Area at the Salmon Creek Unit, and the Lanphere Dunes and Ma-le'l Dunes .

The Refuge is located along the Pacific Flyway, providing valuable habitat to migratory birds. The Salmon Creek and Hookton Slough Units currently have 3.0 miles of trails traversing through a diversity of wildlife habitat. Tidal flats, salt marsh and freshwater marshes are all components of these units. Birds from waterfowl, shorebirds, hawks, sparrows and warblers to deer, otters, and harbor seals are just a sample of the wildlife that uses these habitats. Within 15 years, the refuge expects to provide 35,000 annual wildlife observation and photography visitor opportunities by land and water trails and to provide 3.0 miles of wheelchair accessible trail (the entire Shorebird Loop and Hookton Slough Trails). The Hookton Slough Unit is open daily sunrise to sunset and the Salmon Creek Unit is open every day from 8:00 A.M. to 5:00 PM.

There are ~4.0 miles of trails in the North Bay units, Lanphere Dunes and Ma-le'l Dunes. These units contain globally rare vegetation types, coastal coniferous forest, sand dune, and beach habitats and offer the public a unique opportunity for nature recreation. Within 15 years, the refuge expects to provide a total of 0.5 miles of accessible trail at the Ma-le'l Dunes Unit and implement all phases of the Ma-le'l Dunes Cooperative Management Area Access Plan which includes: an expanded trail system, interpretive panels, a viewing deck, a volunteer caretaker, restrooms, and a non-motorized boat launch (if feasible) at the Ma-le'l Dunes Unit. The majority of these improvements will be acquired through a grant from the California Coastal Conservancy. The Lanphere Dunes Unit is open by permit only. The Ma-le'l Dunes Unit will be opened to the public as soon as the Ma-le'l Dunes Cooperative Management Agreement is approved.

The two priority uses would be conducted much as they are at this time. They would be allowed only on designated trails and at the photo blind and proposed Children's Outdoor Exploration Area. Permitted uses are only allowed on designated trails or other public use locations. Walking off-trail can harm sensitive vegetation and/or disturb wildlife. "Closed Area" signs mark areas closed to public entry. Entry on all or portions of specific areas may be temporarily suspended by posting upon occasions of unusual or critical conditions affecting land, water, vegetation, wildlife populations, or public safety.

Providing access for wildlife observation and photography will allow public access and enjoyment of scenic views and an array of wildlife including waterfowl, other migratory birds, wetland and salt marsh plants and resident wildlife and dune and coastal ecosystem plants and wildlife. These areas provide opportunities for wildlife enjoyment not usually available on adjacent private land. Refuge visitors will better understand the challenges facing our wildlife and wild lands resources, what effects the public can have on wildlife resources, and learn more about the Service's role in conservation. People will better understand the biological facts underlying our management programs, and why wildlife and wild lands are important. These two priority uses will provide opportunities for the public to observe wildlife habitats firsthand and learn about wildlife and wild lands at their own pace in an unstructured environment. Photographers will gain opportunities to photograph wildlife and natural habitats. Those opportunities can result in increased publicity and advocacy for Service programs.

Availability of Resources:

To continue accommodating public use at the current level would not require a significant increase in maintenance or visitor service staff expenditures. Using a combination of automatic trail counters, hand counting at the Salmon Creek Unit Visitor Center, and indirect methods, monitoring indicates that current public use is no more than 50 visitors at any one time on the refuge, except for during special events. Staff time associated with administration of these uses is related to maintaining trails, kiosks, gates, signs, providing information to the public about the use, conducting visitor surveys, analyzing visitor use patterns, and monitoring the effects of the use on refuge resources. Staff and or volunteers would administer the program and would monitor the effects of public access. Through a cooperative agreement, Rangers with the Bureau of Land Management will conduct law enforcement activities to provide for visitor safety and resource protection. New funding provided in 2008 allows for a part time permanent staff position dedicated to Visitor Services and Outreach, which will significantly assist refuge efforts in providing these

priority public uses. In addition, there are funds in an existing contract to provide additional improvements in signage, interpretation, and existing facilities to help accommodate these uses.

Maintenance of trails and facilities are costs related to accommodating these uses. The major portion of the funds needed to support the two priority uses are salaries for staff to maintain the trails and to provide protection and monitoring; additional funds are needed for maintenance materials and other supplies. At the Salmon Creek and Hookton Slough Units there are restrooms that are maintained and open year-round for public users of the trail system. Additionally, there are kiosks, interpretive panels, displays, and brochures at the Salmon Creek and Hookton Slough Units that provide important information on refuge resources, management and rules to help the users have an enjoyable, safe experience while at the refuge. The kiosks receive regular maintenance and brochure replenishment. It is estimated that approximately one day per week is spent at each location conducting routine maintenance, trail clearing, and general upkeep and one day per week is spent on general public assistance for these activities. The CCP prescribes additional visitor facilities and activities, some of which are covered under other compatibility determinations. The estimated cost of constructing and maintaining these structures is detailed below. However, the development of many of the strategies in the CCP is dependent upon receiving adequate funding and staffing. The Refuge will continue to manage these activities at current levels until this funding is made available.

Facilities

Material/Facility Proposed	Explanation of Need	Cost [1] annual cost [2] one time cost
Special equipment, facilities, or improvements & maintenance	Scopes, binoculars, brochures, handouts, special events	$5001
Trails, panels, kiosks, Visitor Center & photo blinds	Maintenance (mowing, gravel, etc)	$2,0001
Construction of photo blind for mobility-impaired individuals		$5,0002
Total Annual Cost for Facilities		**$2,5001**

Staffing

Position	Involvement	FTE	Annual Cost
Project Leader	General oversight of programs & budget	0.2	$16,000
Assistant Refuge Manager	Periodic on-site oversight and monitoring of program activities	0.2	$10,000
Maintenance Worker	Facilities maintenance	0.1	$10,000
Visitor Services Assistant	Coordinate and provide oversight of Wildlife observation and photography programs	0.2	$10,000
Total FTEs and Costs for Staffing		**0.7**	**$46,000**

Anticipated Impacts of the Use(s):

Wildlife observation and photography can affect wildlife resources positively and negatively. A positive effect of public involvement in these priority public uses will be a better appreciation and more complete understanding of the refuge wildlife and habitats. Pedestrian travel has the potential of impacting shorebird, waterfowl, and other migratory bird populations feeding and resting near the trails and on beaches during certain times of the year. Human disturbance to migratory birds has been documented in many studies. However, the overall effects to wildlife should not be significant, because most of the refuge lands will experience minimal public use.

Direct, Short-term Impacts:

The presence of humans will disturb wildlife causing temporary displacement without long-term effects on individuals or populations. Some species will avoid the areas people frequent, while others will seemingly be unaffected by the presence of humans.

Activities related to wildlife observation and photography can have negative impacts to wildlife by altering wildlife behavior, reproduction, and distribution. The response of wildlife to human activities includes: site departure (Owen 1973, Burger 1981, Henson and Grant 1991, Klein 1993), use of suboptimal habitat (Erwin 1980, Williams and Forbes 1980), altered behavior (Burger 1981, Morton et al. 1989, Havera et al. 1992, Klein 1993), and increase in energy expenditure (Morton et al. 1989, Belanger and Bedard 1990). McNeil et al. (1992) found that many waterfowl species avoid disturbance by feeding at night instead of during the day. The location of recreational activities impacts species in different ways. Studies have shown that ducks and shorebirds are sensitive to pedestrian activity (Burger 1981, 1986). Resident waterbirds tend to be less sensitive to human disturbance than migrants, and migrant ducks are particularly sensitive when they first arrive (Klein 1993). Miller et al. (1998) found that nesting success was lower near recreational trails, where human activity was common, than at greater distances from the trails. A number of species have shown greater reactions when pedestrian use occurred off trail (Miller et al.1998).

For songbirds, Gutzwiller et al. (1997) found that singing behavior of some species was altered by low levels of human intrusion. Pedestrian travel can impact normal behavioral activities, including feeding, reproductive, and social behavior. In areas where human activity is common, birds tolerated closer approaches than in areas receiving less activity.

Indirect Impacts:

People can be vectors for invasive plants by moving seeds or other propagules from one area to another. Once established, invasive plants can out-compete native plants, thereby altering habitats and indirectly impacting wildlife. The threat of invasive plant establishment will always be an issue requiring annual monitoring and treatment when necessary. Our staff will work at eradicating invasive plants and educating the visiting public.

Cumulative Impacts:

Impacts may be considered not significant when analyzed alone, but may be considered important when they are evaluated cumulatively. The refuge's principal concern is repeated disruptions of resting, foraging, or nesting birds.

Staff knowledge and regular observations of the affected areas show no apparent evidence that these two priority wildlife-dependent uses cumulatively affect the wildlife resource adversely. However, it will be important for refuge staff to monitor these (and other) uses and if necessary respond with management actions to conserve wildlife resources.

Refuge staff, in collaboration with volunteers and researchers, will monitor and evaluate the effects of these priority uses to discern and respond to any adverse effects to wildlife or habitats. Monitoring costs are associated with and included in biological strategies rather than herein for wildlife observation and photography. Based on the best knowledge of managers, no additional adverse effects are expected from providing these two priority uses.

Public Review and Comment:

Wildlife observation and photography were discussed at two public meetings held in conjunction with the Comprehensive Conservation Plan Process. To initiate the CCP process, a Notice of Intent was published in the Federal Register on January 29, 2007. Written comments were solicited from the public about the refuge's operations including public use programs such as wildlife observations and photography. Three CCP planning updates and one planning workbook were prepared to summarize the progress of the CCP and to discuss issues related to the planning process. This compatibility determination will be submitted for public review and comment as an appendix to the Draft Comprehensive Conservation Plan/Environmental Assessment for the for the Humboldt Bay National Wildlife Refuge Complex.

Determination (check one below):

_ Use is Not Compatible

__X_ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

1. Access is limited to walking on designated trails, beach, public roads, and parking lots between sunrise and sunset daily.
2. Camping, overnight use, and fires are prohibited.
3. Harassment of wildlife or excessive damage to vegetation is prohibited.
4. Information on the impacts of disturbance to wildlife and habitat will be made available to the public on a consistent and ongoing basis. Regulations and wildlife friendly behavior (e.g. requirements to stay on designated trails, no dogs, etc.) will be described in brochures and posted at the Visitor's Station.
5. Biological inventories will be conducted to provide baseline information for measuring change. If monitoring and evaluation of the area indicate that there is significant impact or reduction in wildlife use, appropriate action can be taken to restore compatibility, including modifying or discontinuing the use.
6. Signs will be posted at areas closed to the public. Adequate areas would be designated as wildlife sanctuary with no or limited public use activities to provide high quality habitat for feeding, resting, and nesting.

Justification:

The National Wildlife Improvement Act of 1997 (Pub. L. 105-57) identifies six legitimate and appropriate uses of wildlife refuges: hunting, fishing, wildlife observation and photography, and environmental education and interpretation. Where these uses have been determined compatible, they are to receive enhanced consideration over other uses in planning and management.

These uses have been determined compatible because wildlife viewing and photography will not materially interfere with or detract from unit purposes. The continuation of these programs will support the refuge goal of fostering a broader understanding of the value of wildlife conservation. The level of use for wildlife observation and photography is moderate compared with many other refuges in California. The associated disturbance to wildlife is temporary and minor. Under those conditions, the staff does not expect them to materially interfere with or detract from the mission of the System or diminish the purposes for which the refuge was established; nor do we expect them to cause significant adverse effects on refuge resources or cause undue administrative burden.

Mandatory Re-Evaluation Date: (provide month and year for "allowed" uses only)

_____X_____ Mandatory 15-year reevaluation date (for wildlife-dependent public uses)

_____ Mandatory 10-year reevaluation date (for all uses other than wildlife-dependent public uses)

NEPA Compliance for Refuge Use Decision: (check one below)

___Categorical Exclusion without Environmental Action Statement

___Categorical Exclusion and Environmental Action Statement

___Environmental Assessment and Finding of No Significant Impact

___Environmental Impact Statement and Record of Decision

References Cited:

Belanger, L., and J. Bedard. 1990. Energetic cost of man-induced disturbance to staging snow geese. Journal of Wildlife Management 54:36.

Burger, J. 1981. The effect of human activity on birds at a coastal bay. Biological Conservation. 21:231-241.

Burger, J. 1986. The effect of human activity on shorebirds in two coastal bays in northeastern United States. Environmental Conservation. 13:123-130.

Erwin, R. M. 1980. Breeding habitat by colonially nesting water birds in 2 mid-Atlantic U.S. regions under different regimes of human disturbance. Biological Conservation. 18:39-51.

Gutzwiller, K.J., R.T. Wiedenmann, and K.L. Clements. 1997. Does human intrusion alter the Seasonal timing of avian song during breeding periods? Auk. 114:55-65.

Havera, S.P., L.R. Boens, M.M. Georgi, and R.T. Shealy. 1992. Human disturbance of waterfowl on Keokuk Pool, Mississippi River. Wildlife Society Bulletin. 20:290-298.

Henson, P.T., and A. Grant. 1991. The effects of human disturbance on trumpeter swan breeding behavior. Wildlife Society Bulletin. 19:248-257.

Klein, M.L. 1993. Waterbird behavioral responses to human disturbances. Wildlife Society Bulletin. 21:31-39.

McNeil, R., P. Drapeau, and J.D. Goss-Custard. 1992. The occurrence and adaptive significance of nocturnal habitats in waterfowl. Biological Review. 67:381-419.

Miller, S.G., R.L. Knight, and C.K. Miller. 1998. Influence of recreational trails on breeding bird communities. Ecological Applications. 8(1) 162-169.

Morton, J.M., A.C. Fowler, and R.L. Kirkpatrick. 1989. Time and energy budgets of American black ducks in winter. Journal of Wildlife Management. 53:401-410.

Owen, M. 1973. The management of grassland areas for wintering geese. Wildfowl. 24:123-130.

Williams, G.J., and E. Forbes. 1980. The habitat and dietary preferences of dark-bellied Brant geese and widgeon in relation to agricultural management. Wildfowl. 31:151-157.

Refuge Determination:

Prepared by: _____ _____
(Signature) (Date)

Refuge Manager/
Project Leader
Approval: _____ _____
(Signature) (Date)

Concurrence:

Refuge Supervisor: _____ _____
(Signature) (Date)

Assistant Regional
Director - Refuges: _____ _____
(Signature) (Date)

Compatibility Determination for Recreational Boating for Humboldt Bay NWR

Use: Recreational Boating

Refuge Name: Humboldt Bay National Wildlife Refuge, Humboldt Bay National Wildlife Refuge Complex

County and State: Humboldt County, California.

Establishing and Acquisition Authority(ies):

Humboldt Bay NWR was established under the authority of The Migratory Bird Conservation Act of 1929, The Migratory Bird Hunting and Conservation Stamp Act of 1934, the Fish and Wildlife Act of 1956, the Refuge Recreation Act of 1962, and The Endangered Species Act of 1973.

Refuge Purpose(s):

According to these authorities, Humboldt Bay NWR's purposes are:

"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. §§ 715d (Migratory Bird Conservation Act)

"... as Waterfowl Production Areas subject to... all of the provisions of such Act [Migratory Bird Conservation Act] ... except the inviolate sanctuary provisions ..." 16 U.S.C. 718(c) (Migratory Bird Hunting and Conservation Stamp Act)

"... for the development, advancement, management, conservation, and protection of fish and wildlife resources ..." 16 U.S.C. §§ 742f(a)(4) and "... 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) (Fish and Wildlife Act of 1956)

"...suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species..." 16 U.S.C. §§ 460k-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 (Refuge Recreation Act [16 U.S.C. §§ 460k-460k-4], as amended)

"... to conserve (A) fish or wildlife which are listed as endangered species or threatened species ....or (B) plants ..." 16 U.S.C. §§ 1534 (Endangered Species Act of 1973)

National Wildlife Refuge System Mission:

"The mission of the 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."

Description of Use(s):

The Humboldt Bay NWR (Refuge) proposes to continue to allow motorized and non-motorized recreational boating in all bay waters including Hookton Slough, White Slough, Mad River Slough and Humboldt Bay. Recreational boating use addressed in this compatibility determination is only for non-motorized boats,

including kayaks and canoes. Although boating is not a wildlife-dependent public use, it does facilitate other wildlife-dependent uses such as hunting, fishing, wildlife observation, photography and environmental education.

The Hookton Slough Unit non-motorized boat launch is currently open to public use daily from sunrise to sunset. Permits are not required from the refuge for this public use. There are several staff guided canoe/kayak trips each year. There are also boat launches off the refuge on Lanphere Road and Samoa Highway where the roads cross Mad River Slough that are continuously open. Boat accessibility to the sloughs and Humboldt Bay is often determined by the tides.

Canoeing and kayaking use of the bay and sloughs have increased significantly in this area and recreational boating allows the public to observe wildlife and habitats from a unique vantage point. The refuge has an ADA compliant non-motorized boat launch at the Hookton Slough Unit which provides access to natural areas of Humboldt Bay to the mobility impaired public.

Availability of Resources:

The following funding/annual cost would be required to administer and manage boating activities as described above:

Facilities

Material/Facility Proposed	**Explanation of Need**	**Cost** (approximate)
Maintenance of non-motorized boat launch at Hookton Slough Unit	Necessary to provide safe and functional facility	$500 annually
Signage/Outreach	Inform public on appropriate use, safety, and habitat protection, brochures, interpretive displays	$250 annually
Total:		

In anticipation of meeting the necessary conditions to address the concerns put forth by the California Department of Public Health over water quality and proximity of boating to oyster growing locations, funding for the Ma-le'l Dunes Unit non-motorized boat launch has been proposed through Phase 2 implementation of the Ma-le'l Dunes Cooperative Management Plan. Other sources of funding would be sought through partnerships, grants, coordination with other agencies, and additional Refuge operations funding to support a safe, quality program.

Anticipated Impacts of the Use(s):

Humboldt Bay NWR provides crucial foraging and resting habitat for wintering migratory birds, including waterfowl, shorebirds, seabirds, and other waterbirds. Recreational boating affects their use of refuge and other bay waters. Boating activity, both motorized and non-motorized, can alter distribution, reduce use of particular habitats or entire areas by waterfowl and other birds, alter feeding behavior and nutritional status, and cause premature departure from areas (Knight and Cole 1995). More sensitive species may find it difficult to secure adequate food or loafing sites as their preferred habitat becomes fragmented and recreation-related disturbances increase (Skagen et al. 1991; Pfister et al. 1992). During migration and wintering Pacific brant can be considered obligate feeders on eelgrass. Because of this and the fact that there are relatively few locations along the Pacific coastline which sustain large eelgrass beds, Humboldt Bay is one of the three most important locations on the U.S. west coast for brant. Approximately 60% of the Pacific flyway brant population spends some period of time each year at Humboldt Bay. Because the majority of brant use occurs between January and mid-April when the weather is fairly severe, it is expected that disturbance will be minimal because few recreational boaters are on the bay at that time.

Another species with the potential to be impacted by boaters are the double-crested cormorants that nest in a colony along the remaining dike on the northeast side of Teal Island. However, aerial survey data collected on this colony in recent years does not indicate any decline in nests or total numbers of cormorants.

A third species that could be impacted is the harbor seal. Harbor seals haulout and bear their pups on bay tideflats, often adjacent to large channels. Harbor seals are afforded protection under the Marine Mammal Protection Act of 1972.

Canoes and kayaks can cause significant disturbance effects based on their ability to penetrate into shallower areas of a marsh or estuary (Speight 1973, Knight and Cole 1995). Canoes or slow-moving boats have been observed to disturb great blue herons (Vos et al. 1985). Huffman (1999) found that non-motorized boats within 30 meters of the shoreline in south San Diego Bay caused all wintering waterfowl to flush between the craft and shore. However, compared to motorboats, canoes and kayaks appear to have less disturbance effects on most wildlife species (Huffman 1999, DeLong 2002). The overall effects to wildlife should not be significant, because we expect most of the refuge lands will experience relatively light public use. However, monitoring should be done to: 1) establish a baseline of non-motorized boat use on different areas of the bay which either do or are expected to receive the highest use, and 2) compare with previous data collected on brant and harbor seal use of South Bay.

The local shellfish growers and California Department of Public Health have expressed concerns about potential impacts (increased potential for contamination) to water quality by increased numbers and/or concentrations of boaters, particularly in the lower Mad River Slough area where their operations are concentrated. For an analysis of the potent effects of boaters on water quality, refer to the environmental assessment appendix in the Service's 2008 Draft Comprehensive Conservation Plan/Environmental Assessment (CCP/EA) (USFWS 2008).

Public Review and Comment:

To initiate the CCP process, a Notice of Intent was published in the Federal Register on January 29, 2007. Written comments were solicited from the public about the refuge's operations including public use programs such as wildlife observations and photography. Four CCP planning updates and one planning workbook were prepared to summarize the progress of the CCP and to discuss issues related to the planning process. This determination is being developed as part of the Refuge's Comprehensive Conservation Plan and will be subject to further review during the review phase of the overall plan. The shellfish growers, Humboldt Bay Harbor Recreation and Conservation District (HBHRCD), and California Department of Public Health expressed concerns over water quality during the public scoping for the CCP/EA. The shellfish growers, HBHRCD, the California Coastal Commission, Humboldt County Department of Environmental Health, and the Environmental Protection Agency are included on the CCP/EA mailing list and will receive notification of availability of the Draft CCP/EA for review and comment.

Determination (check one below):

___ Use is Not Compatible

_X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

1. Monitoring of boating activities and associated effects on waterfowl (especially brant), waterbirds, other migratory birds, and harbor seals will be conducted to compare against previous use data for brant and harbor seals. Monitoring data will be used by the Refuge to evaluate impacts.

2. Coordination with other agencies such as the CA Dept. of Fish and Game, CA Dept. of Public Health, Humboldt Bay Harbor, Recreation and Conservation District and Shellfish Growers as well as boating groups such as Explore Northcoast and other interested businesses and individuals regarding issues such as water quality and disturbance.

3. Water quality sampling and analysis as well as concurrence with the entities mentioned in number 2 above will be necessary prior to establishment of a non-motorized boat launch on the Ma-le'l Dunes Unit.

4. Environmental interpretive displays/brochures will be developed to educate the public about the potential effects of boating on sensitive habitats, wildlife and water quality.

5. Boaters must abide by the State boating regulations.

Justification:

Boating itself is not considered wildlife-dependent recreation, but many wildlife-dependent recreational activities (fishing, waterfowl hunting, environmental education, interpretation, and wildlife observation/ photography) are associated with boating. Providing opportunities for wildlife-dependent priority public uses would contribute toward fulfilling provisions under the National Wildlife Refuge System Administration Act as amended in 1997. Although boating has a potential to impact wetlands and wildlife, implementing the prescribed measures listed in the Stipulations section will minimize these impacts. It is anticipated that an adequate amount of estuary habitat would be available to the majority of waterfowl and other wetland birds because some high wildlife use areas will be closed to boating, and boating regulations would be maintained and enforced. Thus, it is anticipated that birds will find sufficient food resources and resting places such that their abundance and use of the Refuge will not be measurably lessened, the physiological condition and production of waterfowl and other waterbirds will not be impaired, their behavior and normal activity patterns will not be altered dramatically, and their overall status will not be impaired. The Refuge will also implement a monitoring program to help assess disturbance effects on wildlife and habitat. Improved outreach and educational information for Refuge visitors involved in activities associated with boating would also help to reduce the impacts associated with boating activities.

Mandatory Re-Evaluation Date:

_____ Mandatory 15-year reevaluation date (for wildlife-dependent public uses)

_____X_____ Mandatory 10-year reevaluation date (for all uses other than wildlife-dependent public uses)

NEPA Compliance for Refuge Use Decision: (check one below)

___Categorical Exclusion without Environmental Action Statement

___Categorical Exclusion and Environmental Action Statement

___Environmental Assessment and Finding of No Significant Impact

___Environmental Impact Statement and Record of Decision

References Cited:

DeLong, A. 2002. Managing Visitor Use and Disturbance of Waterbirds. A Literature Review of Impacts and Mitigation Measures.

Huffman, K. 1999. San Diego South Bay survey report-effects of human activity and water craft on wintering birds in South San Diego Bay. USFWS report.

Knight, R.L. and D.N. Cole. 1995. Wildlife responses to recreationists. *in* Wildlife and Recreationists R.L. Knight and K.J. Gutzwiller, (eds.). Island Press, Covelo, California.

Pfister, C., B.A. Harrington, and M. Lavine. 1992. The impact of human disturbance on Shorebirds at a migration staging area. Biological Conservation. 60:115-126.

Skagen, S.K., R.L. Knight, and G.H. Orians. 1991. Human disturbances of an avian scavenging guild. Ecological Applications. 1:215-225.

Speight, M.C.D. 1973. Outdoor recreation and its ecological effects: a bibliography and review. University College London, England, Discussion Papers in Conservation 4. 35pp.

U.S. Fish and Wildlife Service (USFWS). 2008. Humboldt Bay National Wildlife Refuge Complex, Draft Comprehensive Conservation Plan and Environmental Assessment. Refuge Planning, California and Nevada Region, USFWS, Sacramento, CA and Humboldt Bay National Wildlife Refuge Complex, USFWS, Loleta, CA. Appendix E.

Vos, D.K., R.A. Ryder, and W.D. Graul. 1985. Response of breeding great blue herons to human disturbance in north central Colorado. Colonial Waterbirds 8:13-22.

Refuge Determination:

Prepared by:	_____ (Signature)	_____ (Date)
Refuge Manager/ Project Leader Approval:	_____ (Signature)	_____ (Date)

Concurrence:

Refuge Supervisor:	_____ (Signature)	_____ (Date)
Assistant Regional Director - Refuges	_____ (Signature)	_____ (Date)

Compatibility Determination for Waterfowl Hunting for Humboldt Bay NWR

Use: Waterfowl hunting

Refuge Name: Humboldt Bay National Wildlife Refuge, Humboldt Bay National Wildlife Refuge Complex

County and State: Humboldt County, California.

Establishing and Acquisition Authority(ies):

Humboldt Bay NWR was established under the authority of The Migratory Bird Conservation Act of 1929, The Migratory Bird Hunting and Conservation Stamp Act of 1934, the Fish and Wildlife Act of 1956, the Refuge Recreation Act of 1962, and The Endangered Species Act of 1973.

Refuge Purpose(s):

According to these authorities, Humboldt Bay NWR's purposes are:

"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. §§ 715d (Migratory Bird Conservation Act)

"... as Waterfowl Production Areas subject to... all of the provisions of such Act [Migratory Bird Conservation Act] ... except the inviolate sanctuary provisions ..." 16 U.S.C. 718(c) (Migratory Bird Hunting and Conservation Stamp Act)

"... for the development, advancement, management, conservation, and protection of fish and wildlife resources ..." 16 U.S.C. §§ 742f(a)(4) and "... 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) (Fish and Wildlife Act of 1956)

"...suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species..." 16 U.S.C. §§ 460k-1 (Refuge Recreation Act [16 U.S.C. §§ 460k-460k-4], as amended)

"...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 (Refuge Recreation Act [16 U.S.C. §§ 460k-460k-4], as amended)

"... to conserve (A) fish or wildlife which are listed as endangered species or threatened species ....or (B) plants ..." 16 U.S.C. §§ 1534 (Endangered Species Act of 1973)

National Wildlife Refuge System Mission:

"The mission of the 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-ee]).

Description of Use(s):

The Humboldt Bay NWR proposes to continue to provide opportunities for waterfowl hunting, one of the six priority uses of the National Wildlife Refuge System under the National Wildlife Refuge System Improvement Act of 1966 (16 U.S. C. 668dd-668ee) as amended by The National Wildlife Refuge System Improvement Act of 1997 (Pub.L. 105-57; 111 Stat 1252). The Refuge System Administration Act identifies hunting as one of the six wildlife-dependent recreational uses to be facilitated in the Refuge System, and the Act encourages the Service to provide opportunities for the public to enjoy them. Hunting has been a traditional form of recreation around Humboldt Bay for generations. The hunt program at Humboldt Bay NWR is small compared to many other federal wildlife refuges in California such as Sacramento NWRC or Tule Lake NWR. However, Humboldt Bay NWR provides a unique public land hunting opportunity for the citizens of Humboldt County in general and specifically for the cities of Eureka, Arcata and Fortuna. The high quality hunting resulting from a lottery draw for designated blinds offered at the Salmon Creek Unit of HBNWR is different than the other public lands open to hunting in the area, which are managed as free-roam hunt areas. During the public scoping period for the CCP (January 29 – March 15, 2007) the majority of the comments received about the hunt program supported stable or increased hunting opportunities at the refuge.

Hunting on the refuge has occurred traditionally in White Slough, Eureka Slough, Jacoby Creek, Teal Island and Table Bluff Units, and the controlled hunt area of the Salmon Creek Unit. Concurrent with implementation of the Ma-le'l Dunes Cooperative Management Agreement, hunting will be allowed on 10 acres of the Fernstrom-Root Island and retrieval will be allowed on the Ma-le'l Island of the Ma-le'l Dunes Unit.

The waterfowl hunt program at HBNWR takes place during the normal State waterfowl hunting season, typically lasting 100 to 107 days, usually from the third weekend in October to the last weekend in January as set by the State Commission in accordance with Federal guidelines. Hunting would continue to follow the State waterfowl season. The hunting program would be conducted at the following areas:

Salmon Creek Unit
Hunting at the Salmon Creek Unit occurs two days per week, Tuesday and Saturday from ½ hour before sunrise until 3:00 PM during the entire regular hunting season. During check in hunters will receive a daily hunting permit for their blind. Hunting blinds are selected using a lottery draw occurring 1 and 1/2 hours before legal shooting time on the morning of each hunting day. The hunting permit must be in possession of the hunter while in the field, and hunters must return their permits and report hunting results at the check station by 4:30 PM.

Teal Island
Teal Island is open to hunting Wednesdays, Saturdays, Sundays, holidays and the opening and closing days during the prescribed open season as per Section 3681 of the California Fish and Game code. Teal Island is designated as boat in access only. Hunting is permitted from the levees or from a boat blind. Teal Island may not be accessed for hunting from the Hookton Slough non-motorized boat dock; Fields Landing is the nearest public boat launch.

Jacoby Creek Unit
Jacoby Creek is open to free roam hunting 7 days a week, but the property is designated as boat in access only. No parking is allowed on FWS property. No trespass onto the banks of Jacoby Creek is permitted. Parking along Highway 101 is not recommended and the FWS assumes no responsibility or liability for hunters that choose to park along Highway 101. The Arcata Marsh has the closest public boat launching point.

Eureka Slough Unit
The Eureka Slough Unit is open to free roam hunting 7 days a week, but the property is boat in access only. Woodley Island Marina or the launch behind Target department store are the nearest public boat launches.

Table Bluff Unit
Table Bluff Unit is open to free roam hunting 7 days a week. Hunters may access the area either by boat or by walking in.

White Slough/Egret Island Unit
This area is open to hunting Wednesdays, Saturdays, Sundays, holidays and the opening and closing days during the prescribed open season as per Section 3681 of the California Fish and Game code. White Slough and Egret Island are designated as boat in access only; Fields Landing is the nearest public boat launch. Hunting and retrieval are allowed on all of the salt marsh islands but access and hunting is not allowed on any of the dikes and lands inside the dikes. Retrieval is not allowed in the Salmon Creek Unit. Shooting is not allowed within 150 yards of Highway 101 or Tompkins Hill Road.

Hookton Slough Unit
Hookton Slough is open to hunting Wednesdays, Saturdays, Sundays, holidays and the opening and closing days during the prescribed open season as per Section 3681 of the California Fish and Game code. Hookton Slough is designated as boat in access only. Boat access for hunting is not allowed from the Hookton Slough non-motorized boat dock; Fields Landing is the nearest public entry point. No shooting is allowed within 150 yards of the Hookton Slough non- motorized boat dock. All other areas of Hookton Slough Unit are closed to hunting.

Fernstrom-Root Island (Ma-le'l Dunes Unit)
Concurrent with the implementation of the Ma-le'l Dunes Cooperative Management Agreement, Fernstrom-Root Island will be open to hunting 7 days a week. Hunting but no blind construction is allowed on the portion of the Fernstrom-Root Island owned by FWS. The Ma-le'l Island is designated as a retrieval only area. Hunters can access Mad River Slough from the boat ramp on Lanphere Road and from Samoa Boulevard to reach Fernstrom-Root Island.

Hunting would be permitted in accordance with State and Federal regulations and seasons. The specific hunter registration and selection process is as follows:

Hunter Application and Registration Procedures at Salmon Creek Unit
A permit is required to hunt at the Salmon Creek Unit. The Refuge check station opens 2 hours before Eureka legal shoot time. A random drawing for available permits takes place at the check station 1 ½ hours prior to shoot time before each daily hunt. Hunters must be present to be eligible for the draw. The Refuge's controlled waterfowl hunt is operated under the Recreation Fee Program. The permit fee for hunters between the ages of 16 and 61 is $5.00 per person or $10.00 per blind, whichever is greater. There is no fee for junior hunters (age 16 and under), but they must be accompanied by an adult who will assume legal responsibility of the junior hunter. Holders of Golden Age (62 and older) or Golden Access (disabled) Passports pay half price.

Description of Hunter Selection Process at Salmon Creek Unit

Sign in procedure:
Waterfowl hunters or groups of hunters are required to sign in at the check station in order to participate in that days hunt. To sign in, hunters must clearly write the first and last names of all persons in their hunting party (up to four people) on a 4X6 draw application card and turn the card into the check station attendant. When the card is turned in the hunters will be given a corresponding number which will be used in the random lottery draw for available hunting blinds. Hunters must be present in order to participate in the lottery draw.

When the lottery draw is complete and the numbers are posted in the order they were drawn, the check station attendant will begin filling blinds and checking in hunters in the order of the lottery draw. These numbers are also used to prioritize re-filling blinds. Hunters must present a filled out permit card and their hunting license to the check station attendant. The permit must have the assigned blind number written on the permit to be valid. Hunters must have an affixed State duck stamp, an affixed HIP program stamp and be in possession of a Federal duck stamp signed by the hunter in order to hunt.

Joining up:
The first fifteen (15) lottery numbers drawn may join with any other of the first fifiteen (15) draws as long as there are no more than four (4) hunters per blind. Waterfowl hunters or groups of hunters chosen after the first fifteen (15) must wait until their number is called in order to pair with other hunters. The check station attendant will continue to call numbers until all blinds are occupied. Once all blinds are occupied, no more numbers will be called.

Re-filling:
At 10:00 AM the check station attendant will assign priority numbers for re-filling available blinds based on the morning random draw and those present. Hunters must be present in order to maintain their position from the morning draw. If a hunter was not present at the morning draw they would sign in according to the "sign in procedures" listed above. Hunters would then be given a re-fill number after all other priority hunters have either taken a blind or declined to accept a blind.

When a blind has been vacated by all hunters and those hunters have checked out with the check station attendant, the blind is available to be re-filled. Re-fill one has the option of taking the blind or not taking the blind without losing position in line. If re-fill one does not take an available blind, the choice goes to priority two with the same options, so on and so forth.

Use of hunting dogs for retrieval of birds is allowed and strongly encouraged, however dogs must be under control of their owners at all times. Failure to follow any State, Federal or refuge-specific regulations may result in eviction from the Refuge or a citation.

A mobility-impaired ("disabled") blind is available for mobility-impaired hunters. A "mobility-impaired hunter" is defined as: Any person who has been issued a "DMV Disabled license plate, or a permanent parking placard identification card," or a valid "Mobility Impaired Disabled Persons Motor Vehicle Hunting License" (FG form 1460). The blue plastic "Disabled Parking Placard" may not be substituted for the required "Identification card" which bears the name of the mobility-impaired person. Disabled hunters must provide the registration certificate for DMV issued disabled license plates.

Hunting is permitted from designated blind zones. Free roam hunting is not allowed. Hunters are required to remain within designated blind zones, except for retrieving downed birds. Hunter may take their firearms while retrieving downed birds, but no active hunting is allowed when outside of the designated blind zone. Hunters may possess and use, while in the field, no more than 25 shells per hunter, per day. Firearms must be unloaded while being transported between parking areas and hunting sites. A firearm is deemed loaded when there is a live cartridge or shell in, or attached in any manner to, the firearm, including, but not limited to, the firing chamber, magazine, or clip thereof attached to the firearm. (Penal Code & 12031(g)).

Hunter Procedures at other refuge units:

Procedures at other units are free roam hunting in accordance with State regulations and unit specific refuge regulations as described above and in the Humboldt Bay NWR Sport Hunting Plan (Appendix C of the CCP).

Availability of Resources:

The estimated annual cost to administer the hunt program is $8,500. Within the annual Refuge budget the necessary funds are available for this work. The Refuge also participates in the Recreational Fee Program, which offsets some costs of the hunting program.
To regulate the hunting activities on the Refuge the following staffing and equipment would be required:

Equipment

Type of Equipment	Explanation of Need	Cost
Pit blind modification	Prevent strandings of wildlife	$500
Modify harvest record card	Improve hunt program record keeping	$500
Sign posting/improvement	Educate public	$1000
Maps/brochures	Improve interpretation and outreach	$1000
Total Cost for Equipment (one-time cost)		**$3000**

Staffing

Position	Involvement	FTE	Cost
Project Leader	General oversight & budget	0.05	$4K
Assistant Refuge Manager	Periodic on-site oversight	0.05	$2.5K
Heavy Equipment Operator	Hunt Area management/maintenance	0.05	$4K
Visitor's Service Assistant	Planning and implementation of Hunt Program	.2	$10K
Law Enforcement Officer		0.05	$2.5K
Temporary hire	Staff hunt check station	0.2	$15K
Total FTEs and Costs for Staffing		**.6**	**$38K**

Based on the Refuge's current staffing level, adequate staff to patrol and monitor waterfowl hunting activity on the Refuge is available to support the proposed use.

Anticipated Impacts of the Use(s):

The hunting of geese, ducks, coots, common moorhens, and snipe would be allowed under the Refuge's Hunt Program. Direct effects of hunting include mortality, wounding, and disturbance (DeLong 2002). Hunting can alter behavior (i.e. foraging time), population structure, and distribution patterns of wildlife (Owens 1977, Raveling 1979, White-Robinson 1982, Thomas 1983, Bartelt 1987, Madsen 1985, and Cole and Knight 1990). There also appears to be an inverse relationship between the numbers of birds using an area and hunting intensity (DeLong 2002). In Connecticut, lesser scaup were observed to forage less in areas that were heavily hunted (Cronan 1957). In California, the numbers of northern pintails on Sacramento Refuge non-hunt areas increased after the first week of hunting and remained high until the season was over in early January (Heitmeyer and Raveling 1988). Following the close of hunting season, ducks generally increased their use of the hunt area; however, use was lower than before the hunting season began. Human disturbance associated with hunting includes loud noises and rapid movements, such as those produced by shotguns and boats powered by outboard motors. This disturbance, especially when repeated over a period of time, compels waterfowl to change food habits, feed only at night, lose weight, or desert feeding areas (Madsen 1995, Wolder 1993).

These impacts can be reduced by the presence of adjacent sanctuary areas including adjacent wetlands and pastures, the White Slough, Hookton Slough and Salmon Creek Unit Closed Zones, and the Ma-le'l Dunes Unit closed zones where hunting does not occur and birds can feed and rest relatively undisturbed. Sanctuaries or non-hunt areas have been identified as the most common solution to disturbance problems caused from hunting (Havera et. al 1992). Prolonged and extensive disturbances may cause large numbers of waterfowl to leave disturbed areas and migrate elsewhere (Madsen 1995, Paulus 1984). In Denmark, hunting disturbance effects were experimentally tested by establishing two sanctuaries (Madsen 1995). Over a 5-year period, these sanctuaries became two of the most important staging areas for coastal waterfowl. Numbers of dabbling ducks and geese increased 4 to 20 fold within the sanctuary (Madsen 1995). Thus, sanctuary and non-hunt areas are very important to minimize disturbance to waterfowl populations to ensure their continued use of the Refuges.

Intermittent hunting can also be a means of minimizing disturbance, especially if rest periods in between hunting events are weeks rather than days (Fox and Madsen 1997). It is common for Refuges to manage hunt programs with non-hunt days. At Sacramento Refuge, 3-16 percent of pintails were located on hunted units during non-hunt days, but were almost entirely absent in those same units on hunt days (Wolder 1993). In addition, northern pintails, American wigeon, and northern shovelers decreased time spent feeding on days when hunting occurred on public shooting areas, as compared to non-hunt days (Heitmeyer and Raveling 1988). The intermittent hunting per week at Sacramento Refuge results in lower pintail densities on hunt areas during non-hunt days than non-hunt areas (Wolder 1993). However, intermittent hunting may not always greatly reduce hunting impacts.

Hunting is a highly regulated activity, and generally takes place at specific times and seasons (fall and winter) when the game animals are less vulnerable. Managed and regulated hunting will not reduce species populations to levels where other wildlife-dependent uses will be affected.

Hunting is an appropriate wildlife management tool that can be used to manage wildlife populations. Some wildlife disturbance will occur during the hunting seasons. Proper zoning, regulations, and restrictions of days hunted per week at some units from the State regulations will be designated to minimize any negative impacts to wildlife populations using the Refuges. Harvesting permitted species would not result in a substantial decrease in biological diversity on the Refuge.

Through a quality hunting program, the public can gain a deeper appreciation of wildlife and an enhanced understanding of the importance of conserving habitat, which ultimately contributes to the Refuge System mission. A priority for the Refuge is to offer a safe and enjoyable hunting program and to minimize any potential adverse impacts.

Hunting will have a number of short-term impacts on refuge resources. Three impacts we expect are minor damage to vegetation, increased amounts of litter, and some minor disturbance to wildlife by dogs used for retrieval purposes. Other wildlife may be present and hunting will disturb some of them. The impacts will be minor given the percentage of refuge lands open to hunting is only approximately 20 percent; hunters are spaced apart and restricted in their movements at the Salmon Creek Unit, which receives the most impact; and the limiting of hunting days to two per week at the Salmon Creek Unit and three per week at the Hookton Slough and White Slough Units

Recreational hunting will remove individual animals, but does not typically have a significant negative effect on wildlife populations. To ensure that populations are sustainable, the Service, state wildlife agencies, and federal and provincial governments in Canada have long-term cooperative programs that monitor breeding-population status, harvest levels, production, migration, and other parameters utilized for regulating waterfowl harvests. The process of regulating harvests involves a lengthy sequence of public involvement and decision making and participation by the Service, state wildlife agencies, and the Canadian and Mexican governments. It culminates in regulations being set at the flyway level (season lengths, daily bag limits, and outside dates for the earliest opening and latest closing dates for a hunting season) and special regulations at the state level (e.g., split seasons, harvest zones, special seasons, area closures).

As a result, the anticipated waterfowl harvest from the refuge hunting program will have negligible cumulative effects on overall populations of waterfowl and other non-target species. An adequate amount of non-hunting areas will be maintained to support current refuge waterfowl populations and to withstand the cumulative effects of off-refuge hunting programs.

The proposed hunt program is intended to minimize conflicts with other wetland-dependent species (e.g. special status species) through education, monitoring and limiting hunt days and times. Potential biological conflicts include flushing other migratory and resident birds from areas being hunted or the take of non-target species either by mistake or willfully. Minor adverse impacts to wildlife or habitats are anticipated from dogs used for retrieval since they will be under the control of their owners at almost all times.

Because Humboldt Bay is a shared waterway, conflicts may arise among hunters and recreational boaters or anglers. However conflicts among those users should be minimal. Hunting, including the sound of gunfire, does disturb some of our residential neighbors and other refuge users, but we attempt to mitigate that by outreach and by restricting the days and times when we permit hunting. We work with other local, state, and federal law enforcement organizations to provide an increased presence during the hunting season.

Public Review and Comment:

Waterfowl hunting was discussed at two public meetings held in conjunction with the Comprehensive Conservation Plan Process. To initiate the CCP process, a Notice of Intent was published in the Federal Register on January 29, 2007. Written comments were solicited from the public about the refuge's operations including public use programs such as wildlife observations and photography. Three CCP planning updates and one planning workbook were prepared to summarize the progress of the CCP and

to discuss issues related to the planning process. This compatibility determination will be submitted for public review and comment as an appendix to the Environmental Assessment for the draft Comprehensive Conservation Plan for the Humboldt Bay National Wildlife Refuge Complex.

Determination (check one below):

___ Use is Not Compatible

__X_ Use is Compatible With Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Waterfowl hunting programs have been conducted for many years and the special regulations, restrictions, and general operations have been structured to ensure compatibility. If the monitoring described under Availability of Resources indicates that this use materially interferes with or detracts from fulfillment of the National Wildlife Refuge System mission or the purposes of the refuge, we would curtail or eliminate the use. The hunting of geese, ducks, coots, common moorhens and snipe during the waterfowl season as determined by the State on designated areas of the Refuge is subject to the following conditions:

1. Hunters must possess a valid hunting license, an affixed State duck stamp, a signed Federal duck stamp and an affixed Harvest Information Program (HIP) stamp.

2. Hunting hours will coincide with California State Regulations.

3. Non-Toxic shot is required on all refuge units. Shot size is restricted to no larger than "T" for steel shot and "BB" for all other non-toxic shot.

4. Only firearms meeting California State regulations and Department of Fish and Game Regulations relating to waterfowl hunting (DF&G Code Section 507 (a)) are permitted.

5. Hunters may possess no more than 25 shells while in the field.

6. No person may build or maintain fires.

7. When not hunting, dogs must be in vehicles or on a leash and kept under control at all times. Dogs are not allowed to enter closed areas for any reason.

8. Hunters may use only portable blinds or temporary blinds constructed of natural materials. Hunters must dismantle or remove all blinds from the Refuge after each days hunt. No cutting or removal of vegetation for blind construction or for making trails is permitted.

9. Vehicle parking is permitted only in designated areas.

10. Hunters must remove all decoys, shotshell casings and other personal equipment from the Refuge following each day's hunt. Littering is unlawful.

11. Possession or use of alcohol is prohibited on National Wildlife Refuges

12. The refuge will annually review all hunting activities and operations to ensure compliance with all applicable laws, regulations, and policies.

13. Refuge specific hunting information will be available via brochures and the refuge website.

14. The refuge will monitor hunting activity in the field to assure that it does not interfere with other wildlife-dependent uses.

15. We do not allow commercialized guiding.

16. Access is by foot or boat only. We do not allow bicycles or other conveyances. Mobility impaired hunters should consult with the Refuge Manager for allowed conveyances.

17. Any limitations on how close hunters can get to Refuge boundaries? What about including a stipulation on the hours of operation. Are there and Law Enforcement patrols? Sanctuary areas will be maintained?

Justification:

The National Wildlife Refuge System Improvement Act of 1997 (Pub. L. 105-57) identifies six legitimate and appropriate uses of wildlife refuges: hunting, fishing, wildlife observation and photography, and environmental education and interpretation. Where these uses have been determined compatible, they are to receive enhanced consideration over other uses in planning and management.

Migratory waterfowl hunting will not materially interfere with or detract from the mission of the National Wildlife Refuge System or the purposes for which the refuge was established.

The Migratory Bird Conservation Act of 1929, which established inviolate sanctuaries, was amended by the National Wildlife Refuge System Administration Act of 1966. This amendment authorized up to 40 percent of an area acquire for a migratory bird sanctuary to be opened to migratory bird hunting.

Mandatory Re-Evaluation Date: (provide month and year for "allowed" uses only)

_____X_____ Mandatory 15-year reevaluation date (for wildlife-dependent public uses)

_____ Mandatory 10-year reevaluation date (for all uses other than wildlife-dependent public uses)

NEPA Compliance for Refuge Use Decision: (check one below)

___Categorical Exclusion without Environmental Action Statement

___Categorical Exclusion and Environmental Action Statement

___Environmental Assessment and Finding of No Significant Impact

___Environmental Impact Statement and Record of Decision

References Cited:

Bartelt, G.A. 1987. Effects of disturbance and hunting on the behavior of Canada goose family groups in east central Wisconsin. J. Wildl. Manage. 51:517-522.

Cole, D.N., and R.L. Knight. 1990. Impacts of recreation on biodiversity in wilderness. Utah State University, Logan, Utah.

Cronan, J.M. 1957. Food and feeding habits of the scaups in Connecticut waters. Auk 74(4):459-468.

DeLong, A. 2002. Managing Visitor Use & Disturbance of Waterbirds. A Literature Review of Impacts and Mitigation Measures.

Fox, A.D., and J. Madsen. 1997. Behavioral and distributional effects of hunting disturbance on waterbirds in Europe: implications for refuge design. J. Appl. Ecol. 34:1-13.

Havera, S.P., L.R. Boens, M.M. Georgi, and R.T. Shealy. 1992. Human disturbance of waterfowl on Keokuk Pool, Mississippi River. Wildl. Soc. Bull. 20:290-298.

Heitmeyer, M.E., and D.G. Raveling. 1988. Winter resource use by three species of dabbling ducks in California. Dept. Wildlife and Fisheries Biology, Univ. of Calif., Davis. Final Report to Delta Waterfowl and Wetlands Research Center, Portage La Prairie, Manitoba, Canada. 200pp.

Madsen, J. 1985. Impact of disturbance on field utilization o f pink-footed geese in West Jutland, Denmark. Biol. Conserv. 33:53-63.

Madsen, J. 1995. Impacts of disturbance on migratory waterfowl. Ibis 137:S67-S74.

Owens, N.W. 1977. Responses of wintering brant geese to human disturbance. Wildfowl 28:5-14.

Paulus, S.L. 1984. Activity budgets of nonbreeding gadwalls in Louisiana. J. Wildl. Manage. 48:371-380.

Raveling, D.G. 1979. The annual cycle of body composition of Canada geese with special reference to control of reproduction. Auk 96:234-252.

Thomas, V.G. 1983. Spring migration: the prelude to goose reproduction and a review of its implication. *In* Fourth Western Hemispheric Waterfowl and Waterbird Symposium, ed., H. Boyd. 73-81. Ottawa, Canada: Canadian Wildlife Service.

White-Robinson, R. 1982. Inland and salt marsh feeding of wintering brent geese in Essex. Wildfowl 33:113-118.

Wolder, M. 1993. Disturbance of wintering northern pintails at Sacramento National Wildlife Refuge, California. M. S. Thesis, Humboldt State Univ., Arcata. 62pp.

Refuge Determination:

Prepared by: _____ (Signature) _____ (Date)

Refuge Manager/ Project Leader Approval: _____ (Signature) _____ (Date)

Concurrence:

Refuge Supervisor: _____ (Signature) _____ (Date)

Assistant Regional Director - Refuges: _____ (Signature) _____ (Date)

Compatibility Determination for Fishing for Humboldt Bay NWR

Use: Fishing

Refuge Name: Humboldt Bay National Wildlife Refuge, Humboldt Bay National Wildlife Refuge Complex

County and State: Humboldt County, California.

Establishing and Acquisition Authority(ies):

Humboldt Bay NWR was established under the authority of The Migratory Bird Conservation Act of 1929, The Migratory Bird Hunting and Conservation Stamp Act of 1934, the Fish and Wildlife Act of 1956, the Refuge Recreation Act of 1962, and The Endangered Species Act of 1973.

Refuge Purpose(s):

According to these authorities, Humboldt Bay NWR's purposes are:

"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. §§ 715d (Migratory Bird Conservation Act)

"... as Waterfowl Production Areas subject to... all of the provisions of such Act [Migratory Bird Conservation Act] ... except the inviolate sanctuary provisions ..." 16 U.S.C. 718(c) (Migratory Bird Hunting and Conservation Stamp Act)

"... for the development, advancement, management, conservation, and protection of fish and wildlife resources ..." 16 U.S.C. §§ 742f(a)(4) and "... 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) (Fish and Wildlife Act of 1956)

"...suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species..." 16 U.S.C. §§ 460k-1 (Refuge Recreation Act [16 U.S.C. §§ 460k-460k-4], as amended)

"...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 (Refuge Recreation Act [16 U.S.C. §§ 460k-460k-4], as amended)

"... to conserve (A) fish or wildlife which are listed as endangered species or threatened species ....or (B) plants ..." 16 U.S.C. §§ 1534 (Endangered Species Act of 1973)

National Wildlife Refuge System Mission:

"The mission of the 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 Administration Act of 1966, as amended [16 U.S.C.668dd-ee])

Description of Use(s):

Sport fishing (hereafter refered to as "fishing") is currently allowed on the Humboldt Bay NWR (Refuge). The Service proposes to continue to allow fishing, which is one of the six priority uses of the National Wildlife Refuge System under the National Wildlife Refuge System Improvement Act of 1966 (16 U.S. C. 668dd-668ee) as amended by The National Wildlife Refuge System Improvement Act of 1997 (Pub.L. 105-57; 111 Stat 1252). The Refuge System Administration Act identifies fishing as one of the six wildlife-dependent recreational uses to be facilitated in the Refuge System, and the Act encourages the Service to provide opportunities for the public to enjoy them.

Public fishing will continue to be permitted on navigable waters of Humboldt Bay that fall within the existing Refuge boundary. Most fishing in Humboldt Bay will occur from boats on the navigable waters. Fishing will also be permitted from the outer levee of the Hookton Slough Unit, west of the designated parking lot. This area is known as the "Hookton Slough Shoreline Fishing Trail.

Under the Preferred Alternative (Alternative C), in the CCP, we would increase fishing opportunities for visitors by providing fishing access at the Ma-le'l Dunes Unit. Fishing would be opened to the public at the Ma-le'l Dunes Unit at the end of the railroad berm trail, for pedestrian access only. Boaters can also access Mad River Slough from the existing boat launch points on Lanphere Road or from Samoa Blvd. These points are not on refuge property.

Fishing will follow the California Department of Fish and Game's Ocean Sport Fishing Regulations. Fishing will be allowed at the Hookton Slough Unit along the Hookton Slough Shoreline Fishing Trail during daylight hours. Fishing at the Ma-le'l Dunes Unit will be allowed during daylight hours.

Fishing would be conducted in accordance with refuge regulations that apply to all visitors: e.g., no littering, no pets, no feeding or disturbing wildlife or venturing into closed areas. Game fish species to be allowed for legal take will include all native and introduced species listed in the California Ocean Sport Fishing Regulations. Fishing will be permitted in accordance with State and Federal regulations to ensure it will not interfere with conservation of fish and wildlife and their habitats.

1. Fishing is permitted on designated areas of Humboldt Bay NWR subject to the following conditions:
2. Fishing from the designated Hookton Slough Shoreline Fishing Trail and Hookton Slough non-motorized boat dock is permitted during daylight hours only.
3. Only the use of pole and line or rod and reel is permitted while fishing on the refuge.
4. Fishing at Ma-le'l Dunes is pedestrian access only, during daylight hours.
5. Use or possession of alcohol is prohibited on refuge property, as is littering.

Availability of Resources:

The costs of managing the fishing program are minimal, and consist primarily of posting and maintaining "Public Fishing Area" signs and including fishing information in the Refuge brochure and website. Necessary funds are available for this work within the annual budget of the Refuge. There will be no facilities developed or managed specifically for the use of anglers.

Anticipated Impacts of the Use(s):

Fishing as a solitary and stationary activity tends to be less disturbing to wildlife than hunting or boating (Tuite et al. 1983). Fishing may result in increased problems with vandalism and litter such as discarded monofilament line and tackle. Other potential impacts of fishing from motorized boats are the spills of gasoline and motor oil, the release of toxic fumes into the water, and litter that may injure wildlife species.

Sport fish also provide food for many wildlife species, including terns, gulls, wading birds, osprey, and waterfowl. The amount of angling that occurs on refuge waters is not likely to reduce the prey base for those species significantly. The removal of adult fish that prey on forage fish similar to those eaten by bird species may reduce competition for prey, but the removal of adult fish of breeding age may reduce the amount of forage fish (i.e., fewer sport fish fry and juveniles available for fish-eating birds).

Public Review and Comment:

Fishing was discussed at two public meetings held in conjunction with the Comprehensive Conservation Plan Process. To initiate the CCP process, a Notice of Intent was published in the Federal Register on January 29, 2007. Written comments were solicited from the public about the refuge's operations including public use programs such as wildlife observations and photography. Four CCP planning updates and one planning workbook were prepared to summarize the progress of the CCP and to discuss issues related the planning process. This determination is being developed as part of the Refuge's Comprehensive Conservation Plan and will be subject to further review during the review phase of the overall plan.

Determination (check one below)**:**

___ Use is Not Compatible

___ Use is Compatible With Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Fishing will be permitted at Humboldt Bay NWR with the following stipulations:

- Littering regulations will be strictly enforced;
- Use or possession of alcohol while fishing will be prohibited;
- Parking areas, roads, and related access facilities will be maintained as necessary to ensure public safety and to prevent erosion or habitat damage;
- No building or maintaining of fires will be permitted on the Refuge;
- Anglers using boats on the refuge (motorized boats launched from access points around the bay other than the Hookton Slough non-motorized boat dock and non-motorized boats) must abide by the boating stipulations described in the State and Coast Guard regulations on boating;
- Fishing will be allowed during daytime hours only;
- Opportunistic monitoring of fishing program and enforcement by Bureau of Land Management Rangers will encourage compliance with regulations.

The Refuge Manager will have the authority to close certain areas during critical wildlife use periods and cancel any activities deemed necessary to fulfill Refuge purposes or ensure visitors' safety. Sensitive nesting areas will be protected from disturbance by visitors with signs and barriers. Visitors will be directed away from areas where major habitat restoration or management projects are under way.

Justification:

Fishing is a priority wildlife-dependent visitor use provided for in the National Wildlife Refuge System Improvement Act of 1997. By facilitating this use on the Refuge, we hope to increase the visitors' knowledge and appreciation of fish and wildlife, which may lead to increased public stewardship of wildlife and their habitats on the Refuge. Increased public stewardship will support and complement the Service's actions in achieving the Refuge's purposes and the mission of the National Wildlife Refuge System. This program as described is determined to be compatible and will not conflict with the national policy to maintain the biological diversity, integrity, and environmental health of the Refuge.

Mandatory Re-Evaluation Date:

_____X_____ Mandatory 15-year reevaluation date (for wildlife-dependent public uses)

_____ Mandatory 10-year reevaluation date (for all uses other than wildlife-dependent public uses)

NEPA Compliance for Refuge Use Decision: (check one below)

___Categorical Exclusion without Environmental Action Statement

___Categorical Exclusion and Environmental Action Statement

___Environmental Assessment and Finding of No Significant Impact

___Environmental Impact Statement and Record of Decision

References Cited:

Tuite, C.H., M. Ownen, and D. Paynther. 1983. Interaction between wildfowl and recreation at Llangorse Lake and Talybont Resevoir, South Wales. Wildfowl 34:48-63

Refuge Determination:

Prepared by:	_____ (Signature)	_____ (Date)
Refuge Manager/ Project Leader Approval:	_____ (Signature)	_____ (Date)

Concurrence:

Refuge Supervisor:	_____ (Signature)	_____ (Date)
Assistant Regional Director - Refuges	_____ (Signature)	_____ (Date)

Compatibility Determination for Grazing and Haying for Humboldt Bay NWR

Use: Grazing and Haying

Refuge Name: Humboldt Bay National Wildlife Refuge, Humboldt Bay National Wildlife Refuge Complex

County and State: Humboldt County, California.

Establishing and Acquisition Authority(ies):

Humboldt Bay National Wildlife Refuge (NWR) was established under the authority of The Migratory Bird Conservation Act of 1929, The Migratory Bird Hunting and Conservation Stamp Act of 1934, the Fish and Wildlife Act of 1956, the Refuge Recreation Act of 1962, and The Endangered Species Act of 1973.

Refuge Purpose(s):

According to these authorities, Humboldt Bay NWR's purposes are:

"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. §§ 715d (Migratory Bird Conservation Act)

"... as Waterfowl Production Areas subject to... all of the provisions of such Act [Migratory Bird Conservation Act] ... except the inviolate sanctuary provisions ..." 16 U.S.C. 718(c) (Migratory Bird Hunting and Conservation Stamp Act)

"... for the development, advancement, management, conservation, and protection of fish and wildlife resources ..." 16 U.S.C. §§ 742f(a)(4) and "... 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) (Fish and Wildlife Act of 1956)

"...suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species..." 16 U.S.C. §§ 460k-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 (Refuge Recreation Act [16 U.S.C. §§ 460k-460k-4], as amended)

"... to conserve (A) fish or wildlife which are listed as endangered species or threatened species ....or (B) plants ..." 16 U.S.C. §§ 1534 (Endangered Species Act of 1973)

National Wildlife Refuge System Mission:

"The mission of the 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-ee]).

Description of Use(s):

The use is grazing and haying. It is not a priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee) as amended by the National Wildlife Refuge System Improvement Act of 1997. Although not a priority use, managing a certain

amount of vegetation at the Humboldt National Wildlife Refuge (Refuge) through grazing and haying provides habitat in the form of water, food, cover, breeding areas, rearing areas, and sanctuary for a variety of wildlife including migratory birds, waterfowl and shorebirds. Diked areas of the Salmon Creek Unit were primarily used for cattle production from about the turn of the century until 1988. Grazing of the short-grass pasture areas provides habitat primarily for the recently increasing population of Aleutian cackling geese, as well as American wigeon, tundra swans, and many species of shorebirds.

The Service proposes to continue to use grazing and/or haying as a tool for vegetation and wildlife habitat management in the short-grass pasture areas of the Salmon Creek Unit. Grazing and/or haying may be conducted periodically (seasonally) each year. The specified time is determined by the refuge and the cooperator to meet target habitat conditions. Currently the refuge has an agreement with two cooperators to operate on the Salmon Creek Unit.

Grazing (by cattle) and haying would be conducted annually for a specified period (i.e., seasonally) to manage vegetation for native plant and wildlife habitat. The timing is somewhat dictated by growing conditions and other factors but is generally from late April/early May through October.

Grazing and haying are administered with cooperator(s) under a U.S. Fish and Wildlife Service Cooperative Land Management Agreement (CLMA). The CLMA serves as an annual grazing/haying plan and states provisions for habitat objectives, expected wildlife benefits, and operating rules, regulations, and reporting requirements. The CLMA prescribes expected habitat conditions (vegetation height), livestock turn-in/turn-out dates and Animal Unit Months (AUM). The grazing plan has built-in flexibility due to the uncertainties of annual and seasonal precipitation and climate, flooding, and the consequent affect on vegetation growth. This is to insure that expected conditions are met and that refuge vegetation is neither over-grazed nor under-grazed, both conditions result in degraded habitat. Because conditions change during the course of a season, regular monitoring by refuge staff is required.

Availability of Resources

The grazing and haying program is administered by refuge staff that has identified the desired objectives of the program, prepare the CLMA, and provide coordination for cooperators as well as compliance monitoring. The cooperator is generally responsible for the cost of installation and or maintenance of all range improvements associated with program activities. Refuge operational funds are currently available through the Service budget process to administer this program.

Anticipated Impacts of Use

Grazing by native wildlife species has long occurred in the California landscape where it has shaped its botanical and zoological resources (Edwards 1992; Edwards 1996). Currently, livestock grazing is an important method of vegetation management (Barry 2003; Griggs 2000). The grazing/haying program results in both long and short term impacts, both negative and positive. Negative impacts to wildlife resources can result from: trampling or mowing of desirable vegetation and/or wildlife, disturbances to ground nesting species, fencing that may restrict the movement of large animals, the introduction of non-native or invasive plan species seeds or propagules, and soil compaction especially during wet periods. Adverse impacts can be mitigated by moving equipment slowly, so most wildlife moves away from oncoming equipment, and using single wire fencing, which wildlife can easily go under or over.

Conversely, short and long term positive impacts to Refuge habitat and wildlife can result from a well managed grazing/haying program. Primary benefits associated with the grazing/haying program include: an overall reduction of undesirable, non-native vegetation, the creation and maintenance of short-cropped foraging habitat for wintering and migratory birds, especially Aleutian cackling geese, swans and shorebirds.

Overall, seasonal grazing/haying would improve plant species composition and structure so that short-term impacts to wildlife and habitat would be mitigated by long-term benefits to Refuge vegetation and overall wildlife habitat quality. Therefore, there would be a net long-term benefit to habitat for migratory birds and resident deer herds.

Public Review and Comment

To initiate the CCP process, a Notice of Intent was published in the Federal Register on January 29, 2007. In February 2007, three scoping meetings were held, one in Crescent City, one in Eureka, and one in Bayside to receive input from the public on issues related to the management of the Humboldt Bay National Wildlife Refuge. Four CCP planning updates and one planning workbook were prepared to summarize the progress of the CCP and to discuss issues related to the planning process. This compatibility determination will be submitted for public review and comment as an appendix to the Environmental Assessment for the draft Comprehensive Conservation Plan for the Humboldt Bay National Wildlife Refuge Complex.

Determination (check one below)**:**

_____Use is Not Compatible

___X__ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

The Cooperator will operate under the terms and conditions of a Cooperative Land Management Agreement. This document provides the necessary information and assistance from the Refuge to determine periods of use and stocking rates.

Refuge staff will set the value of grazing/haying so as to reflect current fair market values, monitor Cooperator compliance, and maintain complete files on all grazing/haying activities.

Grazing/haying would not be allowed in sensitive natural or cultural areas.

Justification:

This program as described is determined to be compatible. Based upon impacts described in the Draft Comprehensive Conservation Plan and Environmental Assessment (USFWS 2008), it is determined that grazing and haying within the Humboldt Bay National Wildlife Refuge, as described herein, will not materially interfere with or detract from the purposes for which the Refuge was established and the mission of the Refuge System. Refuge livestock grazing and haying by cooperators will directly support Refuge goals, objectives and management plans and activities. Fish, wildlife, plants and their habitat will improve through vegetation management which will result in short-term and long-term reductions of non-native invasive species, increases in biomass and improved foraging conditions for migratory birds and local deer herds. Consequently, the livestock grazing and haying program would maintain biological integrity, diversity and environmental health. The wildlife-dependent, priority public uses (wildlife viewing and photography, environmental education and interpretation, fishing and hunting) would also benefit as a result of improved habitat conditions for wildlife associated with the grazing program. In our opinion grazing and haying will not conflict with the national policy to maintain biological diversity, integrity, and environmental health of the Refuge.

Mandatory Re-Evaluation Date:

_____ Mandatory 15-year reevaluation date (for wildlife-dependent public uses)

_____X_____Mandatory 10-year re-evaluation date (for all uses other than wildlife-dependent public uses)

NEPA Compliance for Refuge Use Decision: (check one below)

___Categorical Exclusion without Environmental Action Statement

___Categorical Exclusion and Environmental Action Statement

___Environmental Assessment and Finding of No Significant Impact

___Environmental Impact Statement and Record of Decision

References Cited:

Barry, S. 2003. Using planned grazing to manage for native grasslands. Pages 1-10, in Section 14, Grazing. Techniques and Strategies for Using Native Grass and Graminoids in Revegetation and Restoration. California Native Grass Association.

Edwards, S.W. 1992. Observations on the prehistory and ecology of grazing in California. Fremontia 20(1):3-11.

Edwards, S.W. 1996. A rancholabrean-age, latest Pleistocene bestiary for California botany. The Four Seasons 10(2):5-34.

Griggs, F.T. 2000. Vina Plains Preserve: eighteen years of adaptive management. Fremontia 27(4) & 18(1): 48-51.

U.S. Fish and Wildlife Service (USFWS). 2008. Humboldt Bay National Wildlife Refuge Complex, Draft Comprehensive Conservation Plan and Environmental Assessment. Refuge Planning, California and Nevada Region, USFWS, Sacramento, CA and Humboldt Bay National Wildlife Refuge Complex, USFWS, Loleta, CA.

Refuge Determination:

Prepared by: _____ _____
(Signature) (Date)

Refuge Manager/
Project Leader
Approval: _____ _____
(Signature) (Date)

Concurrence:

Refuge Supervisor: _____ _____
(Signature) (Date)

Assistant Regional
Director – Refuges: _____ _____
(Signature) (Date)

Compatibility Determination for Mosquito Control for Humboldt Bay NWR

Use: Mosquito Control (Integrated Pest Management [IPM])

Refuge Name: Humboldt Bay National Wildlife Refuge, Humboldt Bay National Wildlife Refuge Complex

County and State: Humboldt County, California.

Establishing and Acquisition Authority(ies):

Humboldt Bay National Wildlife Refuge (NWR) was established under the authority of The Migratory Bird Conservation Act of 1929, The Migratory Bird Hunting and Conservation Stamp Act of 1934, the Fish and Wildlife Act of 1956, the Refuge Recreation Act of 1962, and The Endangered Species Act of 1973.

Refuge Purpose(s):

According to these authorities, Humboldt Bay NWR's purposes are:

"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. §§ 715d (Migratory Bird Conservation Act)

"... as Waterfowl Production Areas subject to... all of the provisions of such Act [Migratory Bird Conservation Act] ... except the inviolate sanctuary provisions ..." 16 U.S.C. 718(c) (Migratory Bird Hunting and Conservation Stamp Act)

"... for the development, advancement, management, conservation, and protection of fish and wildlife resources ..." 16 U.S.C. §§ 742f(a)(4) and "... 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) (Fish and Wildlife Act of 1956)

"...suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species..." 16 U.S.C. §§ 460k-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 (Refuge Recreation Act [16 U.S.C. §§ 460k-460k-4], as amended)

"... to conserve (A) fish or wildlife which are listed as endangered species or threatened species ....or (B) plants ..." 16 U.S.C. §§ 1534 (Endangered Species Act of 1973)

National Wildlife Refuge System Mission:

"The mission of the 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-ee]).

Description of Use(s):

The use is mosquito management, which includes surveillance, and if warranted, control. It is not a priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System

Administration Act of 1966 (16 U.S.C. 668dd-668ee) as amended by the National Wildlife Refuge System Improvement Act of 1997.

Humboldt Bay National Wildlife Refuge proposes to follow the direction of the Refuge System and Regional Mosquito Management Policy and continue coordinating with Humboldt County to survey for and control mosquitoes. Humboldt County's Department of Public Health has responsibility for mosquito management but is not a mosquito abatement district. Five mosquito species are known to inhabit the Humboldt Bay National Wildlife Refuge and surrounding areas. These mosquitoes breed in and inhabit salt and freshwater marshes, riparian areas, and man-made objects (old tires, water troughs, backyard ponds etc.). Adult mosquitoes appear as early as April and persist until late summer, depending on the species. The majority of information in this compatibility determination was found in *Best Management Practices for Mosquito Control on California State Properties*, released in June 2008 by the California Department of Public Health (CDPH).

Culex tarsalis – This species transmits West Nile Virus (WNV), Western Equine Encephalitis (WEE), and St. Louis Encephalitis (SLE), but is not the most common species found in the county.
Culesita particeps – This species is not considered to be an important health concern or vector.
Aedes increptus, Aedes dorsalis, and *Aedes vexan* – There are 24 species of *Aedes* mosquitoes in California, including these three. As a group these mosquitoes are the most aggressive. They lay single eggs on intermittently flooded surfaces including all wetland types. The eggs are resistant to drying out and can remain dormant but viable for at least three years.

Mosquito management on the Humboldt Bay NWR is addressed through an integrated pest management approach in which the Refuge coordinates with the county to manage the overall environmental health of adjacent communities while minimizing impacts to Refuge trust resources.

The current procedures for implementing mosquito management on this Refuge involve water management. From the standpoint of mosquito production there are two types of wetlands on the refuge. Most wetlands are seasonal, meaning they dry up in late spring or early summer. These wetlands rarely produce mosquitoes during this time because they typically are dry before water temperatures are warm enough to produce mosquitoes and "flood-up" occurs well after "mosquito season" is done in mid-October. Other wetlands on the refuge are estuarine or tidal in nature. The key to preventing estuarine wetlands from producing an extraordinary amount of salt marsh mosquitoes is making sure there is good hydrologic connection in these areas and that tidegates don't leak or when they do they are fixed quickly. This allows fish and other predators that come in with the tidal flow to eat mosquito larvae before they become adults. In a natural salt marsh, some mosquitoes are always produced because during extreme high tides, generally some water gets into isolated areas for a long enough period (10-14 days) for mosquito production to occur. Because almost all marsh on the refuge is behind tidegates, refuge staff has to be vigilant about monitoring refuge wetlands during summer and fall and making sure mosquito production stays at a minimal level. While there are always going to be some mosquitoes produced on the refuge, staff and adjacent landowners are well aware when an extraordinary situation arises and then refuge staff consults with the county and deals with the situation accordingly.

Public concern over human health issues related to mosquito-borne disease has intensified with the advance of West Nile Virus across the United States. To address mosquito management, a phased response strategy has been developed for implementation on refuges in the Pacific Region. This strategy encourages an integrated pest management approach that incorporates habitat and best management practices to reduce the need for and use of insecticides on refuges, while also ensuring that legitimate human, fish, and wildlife health concerns are addressed. To implement this phased response strategy, the current procedures for managing mosquitoes on this Refuge will be augmented to better identify thresholds for mosquito treatment and will present specific responses to various conditions encountered in the field. If mosquito population monitoring and disease surveillance (implemented by the county) indicate that human health thresholds are exceeded, the use of larvicides and/or adulticides will be considered.

Two larvicide compounds that could be used to manage mosquitoes on the Refuge include: Bti (*Bacillus thuringienensis israelensis)* and Altosid (methoprene). Both are larvicides intended to control mosquitoes in wetlands prior to their emergence as adults. Bti is used primarily to control early stage larvae and is available in liquid and granular formulations. Altosid is used on later stage mosquito larvae and is available in liquid, briquette and pellet formulations. Both compounds are highly specific to mosquito larvae.

Availability of Resources
Refuge operational funds are currently available through the Service budget process to administer this program. Because of the relative rarity of a mosquito "outbreak" indicating health risk in Humboldt County, the county does not have a mosquito abatement district, nor does it generally spray adulticides for control.

Anticipated Impacts of Use

Anticipated positive impacts of a mosquito control program at the Humboldt Bay NWR include the following:

- The minimization of health risk and annoyance to adjacent landowners and refuge visitors caused by mosquitoes.

Potential negative impacts of a mosquito control program include the following:

- Lethal effects on non-target water-borne invertebrates and potential non-lethal effects to fish and wildlife of Bti and Altosid, should they need to be used.

- Temporary disturbance to wildlife species in the area.

Positive impacts can be maximized and negative impacts can be minimized through:

- Maintenance of good hydrologic connection in estuarine wetlands
- Appropriate monitoring and immediate response

Public Review and Comment

We are publishing this determination for review concurrently with our comprehensive conservation plan (CCP). This use was discussed at two public meetings held in conjunction with the Comprehensive Conservation Plan Process. To initiate the CCP process, a Notice of Intent was published in the Federal Register on January 29, 2007. Written comments were solicited from the public about the refuge's operations including public use programs. Four CCP planning updates and one planning workbook were prepared to summarize the progress of the CCP and to discuss issues related to the planning process. The public review and comment period of the draft plan and associated environmental assessment will offer additional opportunities for comments.

Determination (check one below):

__Use is Not Compatible

__X_ Use is Compatible With Following Stipulations

Stipulations Necessary to Ensure Compatibility:

Special Use Permit conditions will stipulate that all control work will be carried out in conformance with pre-approved USFWS Pesticide Use Proposals, and existing and future USFWS policies on mosquito management.

Justification:

Mosquito management would be implemented on this refuge in accordance with the guidance provided for the Pacific Region by the Regional Office in March 2003 and consideration of Best Management Practices for Mosquito Control on California State Properties, released by the California Department of Public Health in June 2008 (http://cdph.ca.gov or http://westnile.ca.gov). This guidance for mosquito management incorporates a phased-response strategy developed to manage mosquitoes in a manner that is compatible with refuge purposes and uses the best available science while minimizing impacts to fish and wildlife, which

is consistent with the mission of the National Wildlife Refuge System. Mosquito management proposed for this refuge would also address legitimate human, fish, and wildlife health concerns. Implementing mosquito control in accordance with the stipulations presented above would therefore not materially interfere with the ability to achieve the wildlife management goals established for this refuge.

Mandatory Re-Evaluation Date:

_____–_____ Mandatory 15-year reevaluation date (for wildlife-dependent public uses)

_____X_____ Mandatory 10-year reevaluation date (for all uses other than wildlife-dependent public uses)

NEPA Compliance for Refuge Use Decision: (check one below)

___Categorical Exclusion without Environmental Action Statement

___Categorical Exclusion and Environmental Action Statement

___Environmental Assessment and Finding of No Significant Impact

___Environmental Impact Statement and Record of Decision

Refuge Determination:

Prepared by: _____ (Signature) _____ (Date)

Refuge Manager/ Project Leader Approval: _____ (Signature) _____ (Date)

Concurrence:

Refuge Supervisor: _____ (Signature) _____ (Date)

Assistant Regional: Director - Refuges _____ (Signature) _____ (Date)

Compatibility Determination for Plant Gathering for Humboldt Bay NWR

Use: Plant Gathering

Refuge Name: Humboldt Bay National Wildlife Refuge, Humboldt Bay National Wildlife Refuge Complex

County and State: Humboldt County, California

Establishing and Acquisition Authority(ies):

Humboldt Bay NWR was established under the authority of The Migratory Bird Conservation Act of 1929, The Migratory Bird Hunting and Conservation Stamp Act of 1934, the Fish and Wildlife Act of 1956, the Refuge Recreation Act of 1962, and The Endangered Species Act of 1973.

Refuge Purpose(s):

According to these authorities, Humboldt Bay NWR's purposes are:

"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. §§ 715d (Migratory Bird Conservation Act)

"... as Waterfowl Production Areas subject to... all of the provisions of such Act [Migratory Bird Conservation Act] ... except the inviolate sanctuary provisions ..." 16 U.S.C. 718(c) (Migratory Bird Hunting and Conservation Stamp Act)

"... for the development, advancement, management, conservation, and protection of fish and wildlife resources ..." 16 U.S.C. §§ 742f(a)(4) (Fish and Wildlife Act of 1956)

"... 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) (Fish and Wildlife Act of 1956)

"...suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species..." 16 U.S.C. §§ 460k-1 (Refuge Recreation Act [16 U.S.C. §§ 460k-460k-4], as amended)

"...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 (Refuge Recreation Act [16 U.S.C. §§ 460k-460k-4], as amended)

"... to conserve (A) fish or wildlife which are listed as endangered species or threatened species ....or (B) plants ..." 16 U.S.C. §§ 1534 (Endangered Species Act of 1973)

National Wildlife Refuge System Mission:

"The mission of the 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-ee])

Description of Use(s):

The gathering of plants at Humboldt Bay National Wildlife Refuge by Native Americans would be a new use at the Refuge. Gathering plants is not one of the 6 legislated uses of the National Wildlife Refuge System. However, the use of Refuge lands for plant gathering is considered to be of vital importance to Native American cultural groups such as the California Indian Basketweavers Association. Native Americans have historically gathered plant materials around Humboldt Bay. Plants are gathered for a variety of uses; medicinal, ceremonial, food resources, and utilitarian or artistic purposes. Plants gathered for traditional uses may include California blackberry (*Rubus ursinus)*, Evergreen huckleberry (*Vaccinium ovatum*), Willows (*Salix* sp.) and Thimbleberry (*Rubus parviflorus*). Plants are gathered during various seasons. Special use permits will be issued by the Refuge for plant gathering and access regulated to ensure protection of critical habitat during key wildlife use periods.

Availability of Resources:

No additional resources will be needed to support this use. Adequate funding and staff are available to manage this use within the existing Refuge budget.

Anticipated Impacts of the Use(s):
Anticipated impacts from this use are minor damage to vegetation and disturbance to wildlife. No long-term or cumulative impacts are expected on wildlife or habitat.

Immediate responses by wildlife to recreational activity can range from behavioral changes including nest abandonment or change in food habits, physiological changes such as elevated heart rates due to flight, or even death (Knight and Cole 1995). The long term effects are more difficult to assess but may include altered behavior, vigor, productivity or death of individuals; altered population abundance, distribution, or demographics; and altered community species composition and interaction.

According to Knight and Cole (1991), there are three categories of wildlife responses to human disturbance: 1) avoidance; 2) habituation; and 3) attraction. The magnitude of the avoidance response may depend on a number of factors inducing the type, distance, movement pattern, speed, and duration of the disturbance, as well as the time of day, time of year, weather; and the animal's access to food and cover, energy demands, and reproductive status (Knight and Cole 1991; Gabrielsen and Smith 1995). The level of disturbance to wildlife will vary depending on the season, but is considered to be low overall. The gathering of berries and other plant materials that occurs from late summer through fall will have little or no impact on migratory or nesting birds.

Plant gathering can also have adverse impacts on vegetation and soil conditions. Plant gatherers can alter habitats by trampling vegetation, compacting soil, and increasing the potential for erosion (Liddle 1975; Hendee et al. 1990). Impacts to habitat and wildlife associated with plant gathering on the Refuge are minimal. The amount of plant material being harvested is small enough not to constitute any meaningful impact on habitat. Gathering of new plant growth in springtime, herbs for medicinal/ceremonial purposes and willow twigs and bark for basket weaving may coincide with the use of the Refuge by migratory waterfowl. However, because gathering activities are limited by the amount of material required, adverse impacts are also expected to be limited and negligible.

Public Review and Comment:

To initiate the CCP process, a Notice of Intent was published in the Federal Register on January 29, 2007. Written comments were solicited from the public about the refuge's operations including public use programs such as environmental education and interpretation. Four CCP planning updates and one planning workbook were prepared to summarize the progress of the CCP and to discuss issues related to the planning process. This compatibility determination will be submitted for public review and comment as an appendix to the Environmental Assessment for the draft Comprehensive Conservation Plan for the Humboldt Bay National Wildlife Refuge Complex.

Determination (check one below)**:**

___ Use is Not Compatible

_X_ Use is Compatible with Following Stipulations

Stipulations Necessary to Ensure Compatibility:

In order to accommodate access to the refuge for plant gathering and ensure minor impact to habitats and wildlife, the following measures will be taken:

1. Plant gathering activities will be reviewed as a part of annual coordination with tribal representatives. If monitoring by the Refuge reveals that impacts are negatively affecting wildlife or habitat, then permittees will be required to adjust their activities to avoid impacts. Adjustments may include reductions in harvest, changes in timing of gathering, or reductions in numbers of visitors or frequency of visitors.

2. The Refuge Manager has the authority to close areas within the Refuge during sensitive wildlife use periods and cancel any collecting activities deemed necessary to fulfill Refuge purposes or ensure visitor safety. Sensitive nesting areas will be protected from disturbance by visitors with signs and barriers. Visitors will be directed away from areas where major habitat restoration or management projects are in progress.

Justification:

One of the goals of the National Wildlife Refuge System (System) is providing the public an understanding and appreciation of fish and wildlife ecology, wildlife habitat and the human role in the environment. The Service strives to provide priority visitor uses when compatible with the purpose and goals of the Refuge and the mission of the System. The National Wildlife Refuge System Improvement Act of 1997 identifies environmental education and interpretation as priority public uses for National Wildlife Refuges.

The Native American Policy of the U.S. Fish and Wildlife Service state that the Service will provide reasonable access to Service managed lands for exercising ceremonial, medicinal, and traditional activities recognized by the Service and by Native American governments. The Service will permit these uses if the activities are consistent with treaties, judicial mandates, or Federal and tribal law and are compatible with the purposes for which the lands are managed.

Although plant gathering is not a wildlife-dependent recreational use, it is an activity that contributes to environmental education and awareness. An understanding of plant ecology is essential to sustainable plant harvesting, thus this activity helps to educate participants about Humboldt Bay habitats while supporting their cultural practices. Accordingly, the Service has determined that the proposed plant gathering by Native Americans for cultural purposes is a compatible Refuge purpose.

Mandatory Re-Evaluation Date: (provide month and year for "allowed" uses only)

_____ Mandatory 15-year reevaluation date (for wildlife-dependent public uses)

_____X_____ Mandatory 10-year reevaluation date (for all uses other than wildlife-dependent public uses)

NEPA Compliance for Refuge Use Decision: (check one below)

___Categorical Exclusion without Environmental Action Statement

_ _ Categorical Exclusion and Environmental Action Statement

___Environmental Assessment and Finding of No Significant Impact

___Environmental Impact Statement and Record of Decision

References Cited:

Gabrielson, G.W., and E.N. Smith. 1995. Physiological responses of wildlife to disturbance. Pages 95-107 in R.L. Knight and K.J. Gutzwill, ed. Wildlife and Recreationists: coexistence through management and research. Island Press, Washington, D.C. 372pp.

Hendee, J.C., G.H. Stankey, and R.C. Lucas. 1990. Wilderness Management. North American Press, Golden, CO.

Knight, R.L., and D.N. Cole. 1991. Effects of recreational activity on wildlife in wildlands in Transactions of the North American Wildlife and Natural Resources Conference. 56:238-247.

Knight, R.L., and D.N. Cole. 1995. Wildlife responses to recreationists. Pages 71-79 in R.L. Knight and K.J. Gutzwiller, ed. Wildlife and Recreationists: coexistence through management and research. Island Press, Washington, DC.

Liddle, M.J. 1975. A selective review of the ecological effects of human trampling on natural ecosystems. Biol. Conserv. 7:17-36.

Refuge Determination:

Prepared by: _____ _____
(Signature) (Date)

Refuge Manager/
Project Leader
Approval: _____ _____
(Signature) (Date)

Concurrence:

Refuge Supervisor: _____ _____
(Signature) (Date)

Assistant Regional
Director - Refuges: _____ _____
(Signature) (Date)

Compatibility Determination for Research for Humboldt Bay NWR

Use: Research

Refuge Name: Humboldt Bay National Wildlife Refuge, Humboldt Bay National Wildlife Refuge Complex

County and State: Humboldt County, California

Establishing and Acquisition Authority(ies):

Humboldt Bay National Wildlife Refuge (NWR) was established under the authority of The Migratory Bird Conservation Act of 1929, The Migratory Bird Hunting and Conservation Stamp Act of 1934, the Fish and Wildlife Act of 1956, the Refuge Recreation Act of 1962, and The Endangered Species Act of 1973.

Refuge Purpose(s):

According to these authorities, Humboldt Bay NWR's purposes are:

"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. §§ 715d (Migratory Bird Conservation Act)

"... as Waterfowl Production Areas subject to... all of the provisions of such Act [Migratory Bird Conservation Act] ... except the inviolate sanctuary provisions ..." 16 U.S.C. 718(c) (Migratory Bird Hunting and Conservation Stamp Act)

"... for the development, advancement, management, conservation, and protection of fish and wildlife resources ..." 16 U.S.C. §§ 742f(a)(4) and "... 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) (Fish and Wildlife Act of 1956)

"...suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species..." 16 U.S.C. §§ 460k-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 (Refuge Recreation Act [16 U.S.C. §§ 460k-460k-4], as amended)

"... to conserve (A) fish or wildlife which are listed as endangered species or threatened species ....or (B) plants ..." 16 U.S.C. §§ 1534 (Endangered Species Act of 1973)

National Wildlife Refuge System Mission:

"The mission of the 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-ee])

Description of Use(s):

The use is research on refuge resources. It is not a priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee) as amended by the National Wildlife Refuge System Improvement Act of 1997.

The location of the research will vary by project. Usually a research project is limited to a particular habitat type, plan, or wildlife species. On occasion, research projects may encompass an assemblage of habitat types, plants or wildlife. Refuge management will limit the locations of research to those areas of the refuge necessary to conduct any specific, scientific research projects that require it.

The timing of the research will depend on the project. Refuge management may allow scientific research on the refuge throughout the year. A research project could be short-term in design, requiring one or two visits over the course of a few days. Others could be multi-year studies that require daily visits to the study site. The timing of each research project will be limited to the minimum required to complete it. If a research project overlaps a refuge hunting season, special precautions or limitations may be required to ensure the safety of researchers or staff.

The methods of a research project will depend on the project. We will evaluate the methods of each research project before allowing it on the refuge. Research, inventory and information collection activities on the Humboldt Bay National Wildlife Refuge that are directly related to the conservation of fish and wildlife resources which involve negligible animal mortality, disturbance or habitat destruction, and no introduction of either exotic organisms or contaminants will be considered, as will those research activities which seek to increase the public's knowledge and understanding of fish and wildlife resources. Research activities will typically be conducted by University or College professors, students, and other professional resource biologists.

The purposes of research are to further the understanding of the natural resources and improve the management of those resources on the refuges or in the System. Refuge management will assign priority to research applicable to wildlife, habitat, or public use management on or near the refuges of the Complex.

At the Humboldt Bay NWR (Refuge), the refuge manager has issued special use permits (SUPs) for such research as:

- Studies on various species of fish, wildlife and plants
- Mapping of invasive species and rare plants
- Studies on water quality and hydrology

We will encourage and support research and management studies on Refuge lands that improve and strengthen our natural resource management decisions. The Refuge manager will encourage and assign priority to research that:

- Relates to approved Refuge objectives, clearly improves land management, and promotes adaptive management.
- Enables better management of the Nation's biological resources. This could include research which may not relate directly to Refuge-specific objectives, but would contribute to the broader enhancement, protection, use, preservation or management of populations of fish, wildlife and plants, and their natural diversity in the region or flyway.
- Is generally considered important to agencies of the Department of Interior, particularly the U.S. Fish and Wildlife Service, the Refuge System, and State Fish and Wildlife Agencies.
- Addresses important management issues or demonstrates techniques for managing species or habitats.

Research evaluation criteria will include, but not be limited to, the following:

- Research that will contribute to specific Refuge management issues will be given higher priority over other research requests.
- Research that will conflict with other ongoing research, monitoring, or management programs will not be granted.
- Research projects that can be accomplished off-Refuge are less likely to be approved.
- Research that causes undue disturbance or is intrusive will likely not be granted. Level and type of disturbance will be carefully evaluated when considering a request.
- Refuge evaluation will determine if any effort has been made to minimize disturbance through study design, including considering adjusting location, timing, scope, study methods, number of study sites, etc.
- If staffing or logistics make it impossible for the Refuge to monitor researcher activity in a sensitive area, the research request may be denied, depending on the specific circumstances.

- The length of the project will be considered and agreed upon before approval. Projects will be reviewed annually.

Availability of Resources:

Staff time spent reviewing research proposals and administering permits will be minimal. In most cases, a research project may require one to four hours of staff time to coordinate all aspects of a project, including review of the proposal, issuing a Special use Permit, coordinating access to the Refuge, and reviewing project results. Currently, Refuge staff spends an average of 40 hours a year working full time on research projects. Adequate funding and staff exist to manage research projects within the current Refuge budget. Researchers will be required to furnish their own materials and supplies. Supplies and staff time associated with cooperative studies involving the Refuge and other agencies or universities should be covered by appropriate Refuge/joint funds.

Anticipated Impacts of Use:

Disturbance to wildlife and vegetation by researchers could occur through observation, a variety of wildlife capture techniques, banding, and accessing the study area by foot or vehicle. Many studies have demonstrated adverse effects of human disturbances, including researcher activity on wildlife species. For example, Tremblay and Ellison (1979) documented that visits to black-crowned night-heron colonies just before or during laying provoked abandonment of newly constructed nests or either predation of eggs or abandonment of eggs followed by predation. In some instances, investigator disturbance cause mortality of young. Ellison and Cleary (1978) studied the double-crested cormorant to assess the influence of investigators visiting colonies during the breeding season. They discovered the frequent visits caused nest abandonment, predation by gulls, and discouraged late nesting birds from settling in disturbed experimental colonies. Human presence can affect foraging behavior such as location, duration, and time of day (Burger and Gochfield 1991). It is possible that direct or indirect mortality could result as a byproduct of research activities. The objective is always to conduct the research in a fashion such that potential adverse impacts are likely to be outweighed by the knowledge gained about the resource(s).

However, not all research activities negatively affect a species or its habitat. Fredrick and Collopy (1989) found no differences in reproductive parameters in nests of tricolored herons visited frequently (16 times) to those visited infrequently (7 times). Parsons and Burger (1982) reported no differences in black-crowned night heron chick weight between chicks which were handled every two days and those which were handled once during the study.

Studies suggest that the adverse effects of human disturbance are species specific (Gutzwiller et al. 1998). Thus different species are affected by human presence in specific factors such as timing, location and duration (Gutzwiller and Stanley 1999). Knowing what factors disrupt a species, the probability of disturbing that species during research can be decreased. For instance, Ellison (1989) and Buckley and Buckley (1976) provided management guidelines to minimize disturbance to colonial nesting waterbirds by the general public and investigators. By restricting disruptive activities and monitoring researchers, impacts are expected to be minimal.

Public Review and Comment:

We are publishing this determination for review concurrently with our comprehensive conservation plan (CCP). This use was discussed at two public meetings held in conjunction with the Comprehensive Conservation Plan Process. To initiate the CCP process, a Notice of Intent was published in the Federal Register on January 29, 2007. Written comments were solicited from the public about the Refuge's operations including public use programs. Four CCP planning updates and one planning workbook were prepared to summarize the progress of the CCP and to discuss issues related to the planning process. The planning updates have been distributed to a large number of individuals and organizations representing interested members of the public, conservation organizations, hunting, fishing and boating organizations, public agencies, municipalities, special districts, Tribes, and adjoining property owners. The public review and comment period of the draft plan and associated environmental assessment will offer additional opportunities for comments.

Determination (check one below):

__Use is Not Compatible

__X_ Use is Compatible with the Following Stipulations

Stipulations Necessary to Ensure Compatibility:

1. We will require all researchers to submit a detailed research proposal following Service policy in the Service Refuge Manual Chapter 4, section 6 (USFWS 1982). The Refuge must receive at least 60 days to review proposals before research starts. If the collection of wildlife is involved, researchers must give the Refuge 90 days to review their proposal. We will assign priority and approve proposals based on their need, benefit, compatibility, and funding required.

2. We will issue SUPs for all research. Each SUP will list the conditions the Refuge manager determines necessary to ensure compatibility, and identify a schedule for progress reports and the submittal of a final report or scientific paper.

3. We may ask regional Refuge biologists, other Service divisions, State agencies or non-governmental organizations and biologists to provide additional review and comment on any research proposal.

4. We will require all researchers to obtain appropriate state and federal permits.

5. Activities will be held where minimal impact will occur.

6. Refuge staff will monitor researcher activities for potential impacts to the Refuge resources and for compliance with the conditions in the SUP. Researchers will be required to allow Refuge staff to accompany researchers at any time to assess potential impacts and to insure adherence to the SUPs. We may terminate any research project at any time for non-compliance with the SUP conditions, or modify, redesign, relocate or terminate it, if the Refuge manager determines that it is causing unanticipated adverse impacts on wildlife, wildlife habitat, approve priority public uses, or other Refuge management activities.

Justification:

The program as described in the 2008 Draft CCP/EA is determined to be compatible (USFWS 2008). Scientific research will comply with the stipulations listed, and will not interfere with the primary purposes for which the Refuge was established. We encourage approved research to further understanding of Refuge natural resources. Research conducted will not materially interfere with or detract from the mission of the System or the purposes for which the Refuge was established. Research will directly benefit and support Refuge goals, objectives and management plans and activities. Fish, wildlife, plants and their habitats will improve through the application of knowledge gained from research. Biological integrity, diversity and environmental health would benefit from research conducted on natural resources at the refuge. The wildlife-dependent priority public uses would also benefit as a result of increased biodiversity from improved restoration and management plans and activities associated with monitoring and research investigation that address specific restoration and management questions.

Mandatory Re-Evaluation Date:

_____ Mandatory 15-year reevaluation date (for wildlife-dependent public uses)

_____X_____ Mandatory 10-year reevaluation date (for all uses other than wildlife-dependent public uses)

NEPA Compliance for Refuge Use Decision (check one below)**:**

___Categorical Exclusion without Environmental Action Statement

___Categorical Exclusion and Environmental Action Statement

___Environmental Assessment and Finding of No Significant Impact

___Environmental Impact Statement and Record of Decision

References Cited:

Buckley, P., and F. Buckley. 1976. Guidelines for the protection and management of colonially nesting waterbirds. North Atlantic Regional Office. NPS. Boston, MA 54 pp.

Burger, J., and M. Gochfield. 1991. Human activity influence and diurnal and nocturnal foraging of Sanderlings. Condor. 93: 259-265.

Ellison, R.M. 1989. Responses to human intruders by birds nesting in colonies: Experimental Results and management guidelines. Col. Waterbirds 12(1):104-108.

Frederick, R.B., and M.W. Collopy. 1989 Researcher disturbance in colonies of wading birds: Effects of frequency of visit and egg-marking on reproductive parameters. Col. Waterbirds. 12(2):152-157.

Gutzwiller, K.J., and H.A. Stanley. 1999. Spatial extent of human-intrusion effects on Subalpine bird distributions. Condor: 101:378-389

Gutzwiller, K.J., H.A. Marcum, H.B. Harvey, J.D. Roth, and S.H. Anderson. 1998. Bird tolerance to human intrusion in Wyoming montane forests. Condor:100 519-527.

Parsons, K.C., and J. Burger. 1982. Human disturbance and nestling behavior in black-crowned night herons. Condor 84: 184-187.

U. S. Fish and Wildlife Service (USFWS). 1982. National Wildlife Refuge System – Refuge Manual Dept. of Interior USFWS, Washington, D. C.

U.S. Fish and Wildlife Service (USFWS). 2008. Humboldt Bay National Wildlife Refuge Complex, Draft Comprehensive Conservation Plan and Environmental Assessment. Refuge Planning, California and Nevada Region, USFWS, Sacramento, CA and Humboldt Bay National Wildlife Refuge Complex, USFWS, Loleta, CA.

Tremblay, J., and L.N. Ellison. 1979. Effects of human disturbance on breeding of Black-crowned night herons. Auk 96:364-369.

Refuge Determination:

Prepared by: _____ _____
(Signature) (Date)

Refuge Manager/
Project Leader
Approval: _____ _____
(Signature) (Date)

Concurrence:

Refuge Supervisor: _____ _____
(Signature) (Date)

Assistant Regional: _____ _____
Director - Refuges (Signature) (Date)

Compatibility Determination for Research for Humboldt Bay NWR

Use: Research

Refuge Name: Castle Rock NWR, Humboldt Bay National Wildlife Refuge Complex

County and State: Del Norte, California.

Establishing and Acquisition Authority(ies):

Castle Rock National Wildlife Refuge (NWR) was established under the authority of The Migratory Bird Conservation Act of 1929, The Migratory Bird Hunting and Conservation Stamp Act of 1934, the Fish and Wildlife Act of 1956, the Refuge Recreation Act of 1962, and The Endangered Species Act of 1973.

Refuge Purpose(s):

According to these authorities, Castle Rock NWR's purposes are:

"... for use as an inviolate sanctuary, or for any other management purpose, for migratory birds." 16 U.S.C. §§ 715d (Migratory Bird Conservation Act)

"... as Waterfowl Production Areas subject to... all of the provisions of such Act [Migratory Bird Conservation Act] ... except the inviolate sanctuary provisions ..." 16 U.S.C. 718(c) (Migratory Bird Hunting and Conservation Stamp Act)

"... for the development, advancement, management, conservation, and protection of fish and wildlife resources ..." 16 U.S.C. §§ 742f(a)(4) and "... 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) (Fish and Wildlife Act of 1956)

"...suitable for (1) incidental fish and wildlife-oriented recreational development, (2) the protection of natural resources, (3) the conservation of endangered species or threatened species..." 16 U.S.C. §§ 460k-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 (Refuge Recreation Act [16 U.S.C. §§ 460k-460k-4], as amended)

"... to conserve (A) fish or wildlife which are listed as endangered species or threatened species ....or (B) plants ..." 16 U.S.C. §§ 1534 (Endangered Species Act of 1973)

National Wildlife Refuge System Mission (System):

"The mission of the 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-ee])

Description of Use(s):

The use is research on refuge resources. Research is an ongoing use at the Castle Rock NWR (Refuge), and the Service proposes to continue this use. Although it is not a priority public use of the National Wildlife Refuge System under the National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-

668ee) as amended by the National Wildlife Refuge System Improvement Act of 1997, information gained from research can improve management of the refuge and resources.

This Refuge is somewhat unique in that it is an island. This necessarily precludes public access and many research options because of the potential for damaging seabird nesting habitat by breaking through the surface into burrows, disturbance to marine mammals and seabirds, as well as substantial safety issues of getting on and off the island. Over 100,000 common murres normally nest on this refuge. They start arriving on the rock as early as January/February and in most years are there until their chicks depart sometime in July/early August. From ~January through early April there are ~20,000 Aleutian geese which roost on the island at night. In addition, marine mammals, including the Federally listed threatened Stellar's Sea Lion also use the island.

The location of the research on the island will vary by project. Usually a research project is limited to a particular habitat type or wildlife species. On occasion, research projects may encompass an assemblage of habitat types, plants or wildlife. We will limit the locations of research to those areas of the refuge necessary to conduct any specific, scientific research projects that require it and do not cause an incompatible amount of disturbance.

The conditions outlined in the stipulations section will also dictate timing of any research. We may allow remote scientific research (i.e., data gathered from cameras or other remote sensing devices placed on the island or gathered from a plane or a boat, throughout the year. A research project could be short-term in design, requiring one or two visits over the course of a few days. The timing of each research project must be evaluated against potential impacts to resources and will be limited to the minimum required to complete it.

The methods of a research project will depend on the project. We will evaluate the methods of each research project before allowing it on the refuge. Research, inventory and information collection activities on the Castle Rock NWR must be directly related to the conservation of wildlife resources which involve negligible animal mortality, disturbance or habitat destruction, and not allow introduction of either exotic organisms or contaminants. Research activities will be conducted by professional resource biologists, university professors, students, or other qualified personnel as determined by the refuge manager.

The purposes of research are to further the understanding of the natural resources and improve the management of those resources on the refuges or in the System. We will assign priority to research applicable to wildlife, habitat, or public use management on or near the refuges of the Complex.

At Castle Rock NWR, the refuge manager has issued special use permits (SUPs) for such research as gathering population inventory and baseline data for seabirds and marine mammals.

We will encourage and support research and management studies on refuge lands that improve and strengthen our natural resource management decisions. The refuge manager will encourage and assign priority to research that:

- Relates to approved refuge objectives, clearly improves land management, and promotes adaptive management;
- Enables better management of the Nation's biological resources. This could include research which may not relate directly to refuge-specific objectives, but would contribute to the broader enhancement, protection, use, preservation or management of populations of fish, wildlife and plants, and their natural diversity in the region or flyway;
- Is generally considered important to agencies of the Department of Interior, particularly the U.S. Fish and Wildlife Service, the Refuge System, and State Fish and Wildlife Agencies; and
- Addresses important management issues or demonstrates techniques for managing species or habitats.

Research evaluation criteria will include, but not be limited to, the following:

- Research that will contribute to specific Refuge management issues will be given higher priority over other research requests.
- Research that will conflict with other ongoing research, monitoring, or management programs will not be granted.

- Research projects that can be accomplished off-Refuge are less likely to be approved.
- Research which causes undue disturbance or is intrusive will likely not be granted. Level and type of disturbance will be carefully evaluated when considering a request.
- Refuge evaluation will determine if any effort has been made to minimize disturbance through study design, including considering adjusting location, timing, scope, study methods, number of study sites, etc.
- If staffing or logistics make it impossible for the Refuge to monitor researcher activity in a sensitive area, the research request may be denied, depending on the specific circumstances.
- The length of the project and review periods will be considered and agreed upon before approval.

Availability of Resources:

Adequate funding and staff exist to manage research projects within the current refuge budget. Staff time includes review of the proposal, issuing a Special use Permit, coordinating access to the refuge, and reviewing project results. Currently, the Refuge Manager spends an average of 80 hours a year working full time on research projects conducted in collaboration with university researchers. Researchers will likely be required to furnish their own materials and supplies. Supplies and staff time associated with cooperative studies involving the refuge and other agencies or universities will be covered by appropriate refuge/joint funds.

Anticipated Impacts of Use:

Disturbance to wildlife, vegetation and substrate by researchers could occur through observation, a variety of wildlife capture techniques, banding, and access to and departure from the study area. Disturbance to island dependent animals can have greater impacts because they have limited area to escape to and they typically occur in higher densities. In addition, where you have thousands of birds nesting in close proximity, one bad event at a key time and/or location can cause significant abandonment, predation and/or mortality. Many studies have demonstrated adverse effects of human disturbances, including researcher activity on wildlife species. For example, Tremblay and Ellison (1979) documented that visits to black-crowned night-heron colonies just before or during laying provoked abandonment of newly constructed nests or either predation of eggs or abandonment of eggs followed by predation. In some instances, investigator disturbance cause mortality of young. Ellison and Cleary (1978) studied the double-crested cormorant to assess the influence of investigators visiting colonies during the breeding season. They discovered the frequent visits caused nest abandonment, predation by gulls, and discouraged late nesting birds from settling in disturbed experimental colonies. Human presence can affect foraging behavior such as location, duration, and time of day (Burger and Gochfield 1991). It is possible that direct or indirect mortality could result as a byproduct of research activities. The objective is always to conduct the research in a fashion such that potential adverse impacts are likely to be outweighed by the knowledge gained about the resource(s).

However, not all research activities negatively affect a species or its habitat. Fredrick and Collopy (1989) found no differences in reproductive parameters in nests of tricolored herons visited frequently (16 times) to those visited infrequently (7 times). Parsons and Burger (1982) reported no differences in black-crowned night heron chick weight between chicks which were handled every two days and those which were handled once during the study.

Studies suggest that the adverse effects of human disturbance are species specific (Gutzwiller et al. 1998). Thus different species are affected by human presence in specific factors such as timing, location and duration (Gutzwiller and Stanley 1999). Knowing what factors disrupt a species, the probability of disturbing that species during research can be decreased. For instance, Ellison (1989) and Buckley and Buckley (1976) provided management guidelines to minimize disturbance to colonial nesting waterbirds by the general public and investigators. By restricting disruptive activities and monitoring researchers, impacts are expected to be minimal.

Public Review and Comment:

We are publishing this determination for review concurrently with our comprehensive conservation plan (CCP). This use was discussed at two public meetings held in conjunction with the Comprehensive Conservation Plan Process. To initiate the CCP process, a Notice of Intent was published in the Federal Register on January 29, 2007. Written comments were solicited from the public about the refuge's

operations including public use programs. Four CCP planning updates and one planning workbook were prepared to summarize the progress of the CCP and to discuss issues related to the planning process. The planning updates have been distributed to a large number of individuals and organizations representing interested members of the public, conservation organizations, hunting, fishing and boating organizations, public agencies, municipalities, special districts, Tribes, and adjoining property owners. The public review and comment period of the draft plan and associated environmental assessment will offer additional opportunities for comments.

Determination (check one below)**:**

___Use is Not Compatible

__X_ Use is Compatible With Following Stipulations

Stipulations Necessary to Ensure Compatibility:

We will require all researchers to submit a detailed research proposal following Service policy included in the Service's Refuge Manual, Chapter 4, section 6 (USFWS 1982). The refuge must receive at least 90 days to review proposals before research starts. We will assign priority and approve proposals based on their need, benefit, compatibility, and funding required.

We will issue SUPs for all research conducted. Each SUP will list the conditions the refuge manager determines necessary to ensure compatibility, and identify a schedule for progress reports and the submittal of a final report or scientific paper.

We may ask regional refuge biologists, other Service divisions, state agencies or non-governmental organizations and biologists to provide additional review and comment on any research proposal.

We will require all researchers to obtain appropriate state and federal permits.

Activities will be held where minimal impact will occur.

Refuge staff will monitor researcher activities for potential impacts to the refuge and for compliance with the conditions in the SUP. Refuge staff will be free to accompany researchers at any time to assess potential impacts and to insure SUPs are adhered to. We may terminate any research project at any time for non-compliance with the SUP conditions, or modify, redesign, relocate or terminate it, if the refuge manager determines that it is causing unanticipated adverse impacts on wildlife, wildlife habitat, approve priority public uses, or other refuge management activities.

Justification:

The program as described in the CCP and EA is compatible. Scientific research will comply with the stipulations listed, and will not interfere with the primary purposes for which the refuges were established. We encourage approved research to further understanding of refuge natural resources. Research conducted will not materially interfere with or detract from the mission of the System or the purposes for which the refuges were established. Research will directly benefit and support refuge goals, objectives and management plans and activities. Fish, wildlife, plants and their habitats will improve through the application of knowledge gained from research. Biological integrity, diversity and environmental health would benefit from research conducted on natural resources at the refuge. The wildlife-dependent priority public uses would also benefit as a result of increased biodiversity from improved restoration and management plans and activities associated with monitoring and research investigation that address specific restoration and management questions.

Mandatory Re-Evaluation Date:

_____–_____ Mandatory 15-year reevaluation date (for wildlife-dependent public uses)

_____X_____ Mandatory 10-year reevaluation date (for all uses other than wildlife-dependent public uses)

NEPA Compliance for Refuge Use Decision: (check one below)

___Categorical Exclusion without Environmental Action Statement

___Categorical Exclusion and Environmental Action Statement

___Environmental Assessment and Finding of No Significant Impact

___Environmental Impact Statement and Record of Decision

References Cited:

Buckley, P. and F. Buckley. 1976. Guidelines for the protection and management of colonially nesting waterbirds. North Atlantic Regional Office. NPS. Boston, MA 54 pp.

Burger, J. and M. Gochfield. 1991. Human activity influence and diurnal and nocturnal foraging of Sanderlings. Condor. 93: 259-265.

Ellison, R. M. 1989. Responses to human intruders by birds nesting in colonies: Experimental Results and management guidelines. Col. Waterbirds 12(1):104-108.

Frederick, R. B. and M. W. Collopy. 1989 Researcher disturbance in colonies of wading birds: Effects of frequency of visit and egg-marking on reproductive parameters. Col. Waterbirds. 12(2):152-157.

Gutzwiller, K. J. and H. A. Stanley. 1999. Spatial extent of human-intrusion effects on Subalpine bird distributions. Condor: 101:378-389

Gutzwiller, K. J., H. A. Marcum, H. B. Harvey, J. D. Roth, and S. H. Anderson. 1998. Bird tolerance to human intrusion in Wyoming montane forests. Condor:100 519-527.

Parsons, K. C. and J. Burger. 1982. Human disturbance and nestling behavior in black-crowned night herons. Condor 84: 184-187.

U. S. Fish and Wildlife Service (USFWS). 1982. National Wildlife Refuge System – Refuge Manual Dept. of Interior USFWS, Washington, D.C.

Tremblay, J. and L. N. Ellison. 1979. Effects of human disturbance on breeding of Black-crowned night herons. Auk 96:364-369.

Refuge Determination:

Prepared by: _____ (Signature) _____ (Date)

Refuge Manager/
Project Leader
Approval: _____ (Signature) _____ (Date)

Concurrence:

Refuge Supervisor: _____ _____
(Signature) (Date)

Assistant Regional: _____ _____
Director - Refuges (Signature) (Date)

Appendix G: Wilderness Review for Humboldt Bay NWR and Castle Rock NWR

Wilderness Review for Humboldt Bay NWR and Castle Rock NWR

Wilderness Review Process

The purpose of a wilderness review is to identify and recommend for Congressional designation National Wildlife Refuge System (System) lands and waters that merit inclusion in the National Wilderness Preservation System (NWPS). Wilderness reviews are a required element of CCPs and are conducted in accordance with the refuge planning process outlined in 602 FW 1 and 3, including interagency and tribal coordination, public involvement and National Environmental Policy Act (NEPA) compliance.

There are three phases to a wilderness review: inventory, study, and recommendation. The wilderness inventory identifies those lands within the refuge that might have wilderness character and satisfy the definition of wilderness. Each unit must be roadless and be either greater than 5,000 acres; a roadless island of any size; or less than 5,000 acres but of sufficient size to be practicably managed as wilderness. The inventory preliminarily classifies each unit of land that meets these requirements as a wilderness study area (WSA).

The wilderness study further evaluates each WSA for values, resources, and uses to determine if each one merits recommendation from the Service to the Secretary of the Interior as wilderness. The recommendation phase consists of forwarding or reporting recommendations for wilderness designation from the Director through the Secretary and the President to Congress in a wilderness study report. This appendix summarizes the wilderness inventory for Humboldt Bay NWR and Castle Rock NWR.

Inventory Criteria

The wilderness inventory is a broad look at the planning area to identify WSAs. These are roadless areas that meet the minimum criteria for wilderness identified in Section 2(c) of the Wilderness Act.

"A wilderness, in contrast with those areas where man and his works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions, and which: (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological or other features of scientific, educational, scenic, or historical value."

A WSA must appear natural, provide outstanding opportunities for solitude or primitive recreation, meet the size criteria, and may provide other supplemental values. The process for identification of roadless areas and islands in the Complex and application of the wilderness criteria are described in the following sections.

Identification of Roadless Areas and Roadless Islands

Identification of roadless areas and roadless islands required gathering and evaluating land status maps, land uses, road inventory data, and aerial photographs for the Complex. "Roadless" refers to the absence of improved roads suitable and maintained for public travel by means of motorized vehicles primarily intended for highway use. Only lands currently owned by the Service in fee title are discussed in this inventory.

Evaluation of the Naturalness Criteria

In addition to being roadless, a WSA must meet the naturalness criteria. Section 2(c) defines wilderness as an area that "... generally appears to have been affected primarily by the forces of nature with the imprint of man's work substantially unnoticeable." The area must appear natural to the average visitor rather than "pristine." The presence of historic landscape conditions is not required. An area may include some human impacts provided they are substantially unnoticeable in the unit as a whole. Significant human-caused hazards, such as the presence of unexploded ordnance from military activity, and the physical impacts of refuge management facilities and activities are also considered in evaluation of the naturalness criteria. An area may not be considered unnatural in appearance solely on the basis of the "sights and sounds" of human impacts and activities outside the boundary of the unit.

Evaluation of Outstanding Opportunities for Solitude or Primitive and Unconfined Recreation

In addition to meeting the size and naturalness criteria, a WSA must provide outstanding opportunities for solitude or primitive recreation. The area does not have to possess outstanding opportunities for both solitude and primitive and unconfined recreation and does not need to have outstanding opportunities on every acre. Further, an area does not have to be open to public use and access to qualify under this criteria; Congress has designated a number of wilderness areas in the Refuge System that are closed to public access to protect resource values.

Opportunities for solitude refer to the ability of a visitor to be alone and secluded from other visitors in the area. Primitive and unconfined recreation means non-motorized, dispersed outdoor recreation activities that are compatible and do not require developed facilities or mechanical transport. These primitive recreation activities may provide opportunities to experience challenge and risk, self reliance, and adventure.

These two "opportunity elements" are not well defined by the Wilderness Act but, in most cases, can be expected to occur together. However, an outstanding opportunity for solitude may be present in an area offering only limited primitive recreation potential. Conversely, an area may be so attractive for recreation use that experiencing solitude is not an option.

Evaluation of the Size Criteria

Roadless areas or roadless islands meet the size criteria if any one of the following standards apply:

- An area with over 5,000 contiguous acres. State and private lands are not included in making this acreage determination.
- A roadless island of any size. A roadless island is defined as an area surrounded by permanent waters or that is markedly distinguished from the surrounding lands by topographical or ecological features.
- An area of less than 5,000 contiguous federal acres that is of sufficient size as to make practicable its preservation and use in an unimpaired condition and of a size suitable for wilderness management.
- An area of less than 5,000 contiguous federal acres that is contiguous with a designated wilderness, recommended wilderness, or area under wilderness review by another federal managing agency such as the Forest Service, NPS, or Bureau or Land Management.

Evaluation of Supplemental Values

Supplemental values are defined by the Wilderness Act as "...ecological, geological, or other features of scientific, educational, scenic, or historic value." These values are not required for wilderness but their presence should be documented.

Humboldt Bay National Wildlife Refuge

Humboldt Bay National Wildlife Refuge (Humboldt Bay NWR) contains a total of 3,379 discontinuous acres, owned in fee title by the Service. The largest Service-owned segment of contiguous land at Humboldt Bay NWR consists of 1,602 acres, with the next largest being 580 acres. It is bordered by Highway 101 and communities on the east, by the Humboldt Bay on the west, and is largely surrounded by agricultural lands on the south and north. Most of the surrounding agricultural lands were converted from salt marsh,

via construction of a large levee separating south Humboldt Bay lands from tidal influence by the 1910s to 1920s. Other dikes and channels were constructed to control and spread Salmon Creek and other unnamed creeks. Northern dune units of the Humboldt Bay NWR are in a fairly pristine state, with the Lanphere Dunes being the most pristine, relative to other preserved dune ecosystems on the west coast of the United States. Humboldt Bay NWR does contain features of scientific, educational, scenic, and historical value. However, Humboldt Bay NWR does not meet the overall criteria for a wilderness study area because:

- most of the Humboldt Bay NWR has been impacted by man;
- most of HBNWR does not offer outstanding opportunities for primitive or unconfined recreation or solitude; and
- it does not encompass 5,000 contiguous acres.

Castle Rock National Wildlife Refuge

Castle Rock National Wildlife Refuge (Castle Rock NWR) is a 14-acre rocky island approximately ½ mile offshore of Crescent City, California. Castle Rock is primarily affected by the forces of nature with any imprint of man's work substantially unnoticeable. The island is road-less with no permanent structures, and it contains unique California north coastal ecological features of great value. Table G-1 summarizes the findings from the wilderness inventory.

Due to the sensitivity of Castle Rock NWR's wildlife and habitats to disturbance, it would be inconsistent with the Castle Rock NWR's purpose to allow public visitation of the island, and Castle Rock NWR is permanently closed to public visitation. However, lack of public use has not prevented other National Wildlife Refuges from receiving wilderness designation from Congress. Congress has designated several National Wildlife Refuge System wilderness areas which are closed to public use to conserve wildlife and fragile habitats. Designated wilderness areas that are permanently closed to the public include the following:

- Farallon Wilderness
- Imperial Refuge Wilderness
- Oregon Islands Wilderness
- Passage Key Wilderness
- Pelican Island Wilderness
- Three Arch Rocks Wilderness
- Vieques Wilderness
- Washington Islands Wilderness
- West Sister Island Wilderness
- Wisconsin Islands Wilderness

Table G-1. Castle Rock National Wildlife Refuge Wilderness Evaluation

Refuge Unit and Acreage	(1) has at least 5,000 acres of land or is of sufficient size to make practicable its preservation and use in an unconfined condition, or is a roadless island	(2) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable	(3a) has outstanding opportunities for solitude	**OR** (3b) has outstanding opportunities for primitive and unconfined type of recreation;	(4) contains ecological, geological or other features of scientific, educational, scenic, or historical value	Parcel qualifies as a wilderness study area (meets criteria 1, 2, and 3a or 3b)
Castle Rock NWR	Yes, 14 acre roadless island	Yes, although it does have remote operated cameras and solar array for powering the camera.	Yes, although closed to the public	Yes, although closed to the public	Yes	Yes

Castle Rock National Wildlife Refuge Wilderness Study

Castle Rock National Wildlife Refuge was found to possess the required wilderness characteristics defined by the Wilderness Act, and is further evaluated through the refuge planning process to determine its' suitability for designation, management, and preservation as wilderness. Considerations in this evaluation included:

- Quality of wilderness values
- Evaluation of resource values, public uses, and associated management concerns; and
- Capability for management as wilderness or "manageability."

This information provides a basis to compare the impacts of a range of management alternatives and determine the most appropriate management direction for the WSA.

Evaluation of Wilderness Values

The following information considers the quality of the WSAs' mandatory and supplemental wilderness characteristics.

Naturalness

Castle Rock NWR covers approximately 14 acres and is 235 feet high at its peak off of the coast of Crescent City, California. Castle Rock is primarily affected by the forces of nature with any imprint of man's work substantially unnoticeable. It is a roadless island with no permanent structures, and it contains unique California north coastal ecological features of great ecological value.

Outstanding Opportunities for Solitude and Primitive Recreation

Castle Rock has outstanding opportunities for solitude and primitive recreation, but because it provides habitat for so many sensitive birds and mammals, it is closed to public access. Periodic visits to the island are conducted only by Complex staff and academic researchers accompanied by staff, to install and maintain remote sensing wildlife cameras or to conduct other forms of monitoring and research. The island has typically been reached with the aid of a U.S. Coast Guard piloted helicopter. The island is 1/2 mile south of the flight path of aircraft to and from the Del Norte Airport, and under the current conditions does not seem to disturb the wildlife. A remote viewing site and interpretive panels are provided on shore immediately adjacent to Castle Rock NWR on Pebble Beach Drive in Crescent City, California. From the remote viewing location, visitors can see seabirds in flight and resting pinnipeds.

Kayaking, jet skiing and other recreational boating is common around Castle Rock NWR, but landing is not permitted.

Quality of Supplemental Values

Castle Rock NWR offers outstanding ecological values with features of scientific, educational, and scenic interest. Castle Rock NWR's habitat features include relatively deep topsoil, vegetated terraces, sheer rock cliffs, talus slopes, as well as protected sandy beach and reef habitat. These features allow it to support one of the largest populations of nocturnal cavity nesting seabirds in California and one of the most important colonies of common murres on the Pacific coast (Carter et al. 1992, USFWS 2005). It is one of only five sites in the California Current System that supports more than 100,000 nesting seabirds. One species of shorebird, the black oystercatcher, also nests at Castle Rock NWR. The island is important to non-breeding seabirds as well. It serves as a communal roost for thousands of brown pelicans during migration, and has become one of the most important resting sites on the northern California coast for federally listed species, such as the threatened Steller sea lion and the brown pelican. Several California Species of Special Concern that utilize Castle Rock NWR include the tufted puffin, fork-tailed storm-petrel, and double-crested cormorant.

Four species of pinnipeds occur regularly at Castle Rock NWR and its associated reef. Two seals, the elephant seal and harbor seal breed at Castle Rock NWR. The island represents the northernmost colonial

site in the Pacific Ocean where elephant seals regularly and successfully breed. In addition, Castle Rock NWR is part of one of the largest haul-outs for California sea lion in northern California and a key haul-out for a local breeding population of the federally endangered Steller sea lion.

Management Alternatives

Alternative A (Current Management)

Under Alternative A (the "No Action" Alternative), management of Castle Rock NWR would continue unchanged. The Complex works with partners from Humboldt State University, the NPS, and the U.S. Coast Guard to maintain a remote, automatic camera on Castle Rock NWR that can be viewed by the public over the internet. This project is designed to study the abundance and health of the populations of seabirds nesting on Castle Rock. While some species like common murres nest on rock ledges and can be observed through aerial photography; other species, such as rhinoceros auklets, Cassin's auklets, and leach's storm petrels, are nocturnal and burrow into the soft soil making aerial observation impossible. These burrowing species can make tunnels up to six-feet long, into the soft and fragile ground. Any human disturbance on the surface can simply and easily crush and destroy the underground nest of these seabirds.

Castle Rock would continue to be managed by the Complex as it is now. The Complex staff would only land on Castle Rock NWR as necessary for research as determined by the Castle Rock NWR manager and staff/contractors with specific knowledge of the Castle Rock NWR's ecology. Research would continue to take place from off the island via plane or boat, or by remote sensing cameras placed on the island during periods of low wildlife use. Through the use of video cameras as a remote sensing technique, the biologists are able to gather data on relative abundance, burrow use, attendance and departure, nesting chronologies, and breeding behavior of seabird species on Castle Rock.

Alternative B

Alternative B would entail surveys for flora and fauna, and continued efforts to improve research with remote controlled recording devices. The Refuge staff will be participating in at least two community events annually, with increased educational outreach and interpretation, and increased coordination with tribal entities.

Under Alternative B, the Service would not recommend a Wilderness designation for Castle Rock NWR.

Alternative C (Preferred Alternative)

Alternative C would entail restricting any monitoring and research to off-island, recommending Castle Rock NWR for wilderness designation, and completing the associated legislative environmental impact statement. A Wilderness Management Plan would need to be written, with a minimum requirement analysis performed for each planned administrative action because of this recommendation.

The Complex staff would only land on Castle Rock NWR as necessary for research as determined by the Castle Rock NWR manger and staff/contractors with specific knowledge of the Castle Rock NWR's ecology. Research would continue to take place from off the island via plane or boat, or by remote sensing cameras placed on the island during periods of low wildlife use. Through the use of video cameras as a remote sensing technique, the biologists are able to gather data on relative abundance, burrow use, attendance and departure, nesting chronologies, and breeding behavior of seabird species on Castle Rock.

The Refuge staff will be participating in at least three community events annually, with increased educational outreach and interpretation, and increased tribal coordination.

Under Alternative C, the Service would recommend a Wilderness designation for Castle Rock NWR and complete the associated environmental impact statement at a later date.

Evaluation of Manageability and Other Resource Values and Uses

Wilderness designation and management of Castle Rock NWR would be fully compatible with current and proposed Refuge management, and none of the resource values identified above would be foregone or adversely affected as a result of designation. Castle Rock NWR can be managed to preserve its wilderness character in perpetuity, recognizing that a "minimum requirement analysis" and "minimum tool" approach will be required. There are no valid existing private rights, or mineral rights, in this WSA.

Existing and proposed public uses and refuge management activities within the WSA is consistent with Wilderness Act and current Service wilderness management policy in the Refuge Manual (6RM8). None of the current or expected refuge management activities or public uses would diminish the wilderness character. These include scientific research, resource monitoring, and environmental education.

Recommendation

In summary, wilderness designation and management of Castle Rock NWR would be fully compatible with current and proposed Refuge management, and none of the resource values identified above would be forgone or adversely affected as a result of designation. Within the next 10 years, the Refuge Complex plans to submit a recommendation for wilderness designation to the Director for approval and commits to prepare a legislative environmental impact statement (pursuant to National Environmental Policy Act) that supports the recommendation.

Appendix H: Supplemental Legal and Policy Guidance

Supplemental Legal and Policy Guidance

National Wildlife Refuge System Improvement Act of 1997

Statutory authority for Service management and associated habitat management planning on units of the NWRS is derived from the National Wildlife Refuge System Administration Act of 1966 (Refuge Administration Act), which was significantly amended by the National Wildlife Refuge System Improvement Act of 1997 (Refuge Improvement Act, 16 U.S.C. 668dd-668ee). Section 4(a)(3) of the Refuge Improvement Act states, *"With respect to the National Wildlife System [NWRS], it is the policy of the United States that – (A) each refuge shall be managed to fulfill the mission of the System, as well as the specific purposes for which that refuge was established…"* The Refuge Improvement Act also states that the *"…purposes of the refuge and purposes for each refuge mean the purposes specified in or derived from law, proclamation, executive order, agreement, public land order, donation document, or administrative memorandum establishing, authorizing, or expanding a refuge, refuge unit, or refuge subunit."*

The Refuge Administration Act, as amended, clearly establishes wildlife conservation as the core NWRS mission. House Report 105-106, accompanying the Refuge Improvement Act, states *"…the fundamental mission of our System is wildlife conservation…wildlife and wildlife conservation must come first."* In contrast to some other systems of federal lands which are managed on a sustained-yield basis for multiple uses, the NWRS is a primary-use network of lands and waters. First and foremost, refuges are managed for fish, wildlife, plants, and their habitats. In addition, units of the NWRS are legally closed to all public access and use, including economic uses, unless and until they are officially opened through an analytical, public process called the refuge compatibility process. With the exception of refuge management activities which are not economic in nature, all other uses are subservient to the NWRS' primary wildlife management responsibility and they must be determined compatible before being authorized.

The Refuge Improvement Act provides clear standards for management, use, planning, and growth of the NWRS. Its passage followed the promulgation of Executive Order 12996 (April 1996), "Management of Public Uses on National Wildlife Refuges", reflecting the importance of conserving natural resources for the benefit of present and future generations of people. The Refuge Improvement Act recognizes that wildlife-dependent recreational uses including hunting, fishing, wildlife observation and photography, and environmental education and interpretation, when determined to be compatible with the mission of the System and purposes of the Refuge, are legitimate and appropriate public uses of the Refuge System. Section 5 (C) and (D) of the Refuge Improvement Act states "compatible wildlife-dependent recreational uses are the priority general public uses of the Refuge System and shall receive priority consideration in planning and management; and when the Secretary determines that a proposed wildlife-dependent recreational use is a compatible use within a refuge, that activity should be facilitated, subject to such restrictions or regulations as may be necessary, reasonable, and appropriate."

The Refuge Improvement Act also directs the Service to maintain adequate water quantity and quality to fulfill the NWRS mission and refuge purposes, and to acquire, under state law, water rights that are needed for refuge purposes.

Appropriate Use Policy

This policy describes the initial decision process the refuge manager follows when first considering whether or not to allow a proposed use on a refuge. The refuge manager must find a use is appropriate before undertaking a compatibility review of the use. An appropriate use, as defined by the Appropriate Use Policy (603 FW 1 of the Service Manual), is a proposed or existing use on a refuge that meets at least one of the following four conditions:

- The use is a wildlife-dependent recreational use as identified in the Improvement Act.
- The use contributes to the fulfilling of the refuge purpose(s), the Refuge System mission, or goals or objectives described in a refuge management plan approved after October 9, 1997, the date the Improvement Act was signed into law.
- The use involves the take of fish and wildlife under State regulations.
- The use has been found to be appropriate as specified in section 1.11 (603 FW 1 of the Service Manual).

If an existing use is not appropriate, the refuge manager will eliminate or modify the use as expeditiously as practicable. If a new use is not appropriate, the refuge manager will deny the use without determining compatibility. If a use is determined to be an appropriate refuge use, the refuge manager will then determine if the use is compatible (see Compatibility section below). Although a use may be both appropriate and compatible, the refuge manager retains the authority to not allow the use or modify the use. Uses that have been administratively determined to be appropriate are the six wildlife-dependent recreational uses (hunting, fishing, wildlife observation and photography, environmental education, and interpretation) and take of fish and wildlife under State regulations.

This CCP includes a review of appropriateness and compatibility of existing Refuge uses and planned future uses in Appendix F.

Compatibility Policy

Lands within the NWRS are different from other multiple use public lands in that they are closed to all visitor uses unless specifically and legally opened. The Improvement Act states that ". . . the Secretary shall not initiate or permit a new use of a Refuge or expand, renew, or extend an existing use of a Refuge, unless the Secretary has determined that the use is a compatible use and that the use is not inconsistent with public safety." The Improvement Act also states that ". . . compatible wildlife-dependent recreational uses (hunting, fishing, wildlife observation and photography, or environmental education and interpretation) are the priority general public uses of the System and shall receive priority consideration in Refuge planning and management."

In accordance with the Improvement Act, the Service has adopted a Compatibility Policy (603 FW 2) that includes guidelines for determining if a use proposed on a national wildlife refuge is compatible with the purposes for which the refuge was established. A compatible use is defined in the policy as a proposed or existing wildlife-dependent recreational use or any other use of a national wildlife refuge that, based on sound professional judgment, will not materially interfere with or detract from the fulfillment of the NWRS mission or the purposes for which the Refuge was established and contributes to the maintenance of biological integrity, diversity, and environmental health. The Policy also includes procedures for documentation and periodic review of existing refuge uses.

When a determination is made as to whether a proposed use is compatible or not, this determination is provided in writing and is referred to as a compatibility determination. An opportunity for public review and comment is required for all compatibility determinations. For compatibility determinations prepared concurrently with a CCP or step-down management plan, the opportunity for public review and comment is provided during the public review period for the draft plan and associated National Environmental Policy Act document. The Refuge has completed compatibility determinations for 10 uses. These compatibility determinations will be finalized with the CCP. The compatibility determinations prepared in association with this draft CCP/EA are provided in Appendix F.

Biological Integrity, Diversity, and Environmental Health Policy

Section 4(a)(4)(B) of the Refuge Improvement Act states, "In administering the System, the Secretary shall…ensure that the biological integrity, diversity, and environmental health of the System are maintained for the benefit of present and future generations of Americans…" This legislative mandate represents an additional directive to be followed while achieving refuge purposes and the NWRS mission. The Act requires the consideration and protection of a broad spectrum of fish, wildlife, plant, and habitat resources found on a refuge. Service policy guiding implementation of this statutory requirement provides a refuge manager with an evaluation process to analyze his/her refuge and recommend the best management direction to prevent further degradation of environmental conditions; and, where appropriate, and in concert with refuge purposes and NWRS mission, to restore lost or severely degraded resource components. Within the Biological Integrity, Diversity, and Environmental Health Policy (601 FW 3[3.7B]),

the relationships among biological integrity, diversity, and environmental health; NWRS mission; and refuge purposes are explained as follows, "…each refuge will be managed to fulfill refuge purpose(s) as well as to help fulfill the System mission, and we will accomplish these purpose(s) and our mission by ensuring that the biological integrity, diversity, and environmental health of each refuge are maintained and where appropriate, restored."

When evaluating the appropriate management direction for refuges, 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, an understanding of the refuge's role within an ecosystem, and the knowledge of refuge resources, applicable laws and best available science, including consultation with resource experts both inside and outside of the Service.

The priority visitor uses of the NWRS are not in conflict with this policy when they have been determined to be compatible. The directives of this policy do not envision or necessitate the exclusion of visitors or the elimination of visitor use structures from refuges; however, maintenance and/or restoration of biological integrity, diversity, and environmental health may require spatial or temporal zoning of visitor use programs and associated infrastructures. General success in maintaining or restoring biological integrity, diversity, and environmental health will produce higher quality opportunities for providing wildlife-dependent recreational uses.

Draft Wilderness Stewardship Policy Pursuant to the Wilderness Act of 1964
This policy updates guidance on administrative and public activities on wilderness and proposed wilderness within the NWRS. The purpose of the policy is to prescribe how the Service: "...preserves the character and qualities of designated wilderness while managing for the refuge establishing purpose(s), maintains outstanding opportunities for solitude or primitive and unconfined type of recreation, and conducts minimum requirements analyses before taking any action that may impact wilderness character."

The policy emphasizes recreational uses that are compatible and wilderness-dependent. The policy clarifies conditions upon which generally prohibited uses (motor vehicles, motorized equipment, mechanical transport, structures, and installations) may be necessary for wilderness protection. It confirms that: "... we will generally not modify habitat, species population levels, or natural ecological processes in refuge wilderness unless doing so maintains or restores ecological integrity that has been degraded by human influence or is necessary to protect or recover threatened or endangered species."

National Environmental Policy Act of 1969

This Draft CCP and associated National Environmental Policy Act (NEPA) document has been prepared consistent with the requirements of NEPA, the Council on Environmental Quality (CEQ) NEPA regulations (40 CFR Secs. 1500 et seq.), and the Department of Interior's NEPA procedures (Department Manual, Part 516).

Cultural Resources

In 1994 the Service formalized a policy for consultation with Native American Tribes, including during planning. Specifically the policy requires that "The Service will involve Native American governments in all Service actions that may affect their cultural or religious interests, including archaeological sites. The Service will be guided in this respect by such legislation as the American Indian Religious Freedom Act, the National Historic Preservation Act, the Native American Graves Protection and Repatriation Act, and the Archaeological Resources Protection Act. The Service will take appropriate precautions to ensure that locations of protected sites remain confidential.

In March 2003, the President issued Executive Order 13287 to reaffirm our nation's commitment to preserving heritage resources while assessing Federal land management agencies' approaches to overseeing and managing these important assets.

In its broadest sense the Executive Order seeks to:
- Provide leadership in preserving America's heritage by actively advancing the protection, enhancement, and contemporary use of the historic properties managed by the Federal Government.
- Promote intergovernmental cooperation and partnerships for the preservation and use of historic properties.

- Direct Federal agencies to increase their knowledge of historic properties under their care and enhance the management of these assets.
- Encourage agencies to seek partnerships with State, tribal, and local governments and the private sector to make more efficient and informed use of their resources for economic development and other recognized public benefits.
- Better combine historic preservation and nature tourism by directing the agencies to assist in local and regional tourism programs and historic properties that are a significant feature of many State and local programs.

Environmental Justice

On February 11, 1994, the President issued Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations) which directs the US Environmental Protection Agency (EPA) to ensure that agencies analyze environmental effects on minority and low-income communities. The purpose of the executive order is to avoid the disproportionate placement of any adverse environmental, economic, social, or health impacts resulting from Federal actions and policies on minority and low-income populations.

Appendix I: Section 7 ESA Listed Species

Table 1. Threatened and Endangered Species Lists for Humboldt Bay NWR and Castle Rock NWR.

Threatened and Endangered Species in Humboldt County

Type	Scientific Name	Common Name	Category	Critical Habitat	Documented on HBNWR?
Plants					
	Erysimum menziesii (only ssp. *eurekense* found on refuge)	Menzies' wallflower (ssp. *eurekense* = Humboldt Bay wallflower)	E	N	Y
	Layia carnosa	beach layia	E	N	Y
Fish					
	Eucyclogobius newberryi	tidewater goby	E	P	Y
*	*Oncorhynchus kisutch*	S. OR/N. CA Coho salmon	T	Y	Y
*	*Oncorhynchus mykiss*	Northern California steelhead	T	Y	Y
*	*Oncorhynchus tshawytscha*	CA coastal Chinook salmon	T	Y	Y
Birds					
	Brachyramphus marmoratus	marbled murrelet	T	P	N
	Charadrius alexandrinus nivosus	Western snowy plover	T		
	Pelecanus occidentalis	brown pelican	E	N	Y
	Strix occidentalis caurina	northern spotted owl	T	Y	N
Mammals					
*	*Balaenoptera borealis*	sei whale	E	N	N
*	*Balaenoptera musculus*	blue whale	E	N	N
*	*Balaenoptera physalus*	fin whale	E	N	N
*	*Eumetopias jubatus*	Steller (=northern) sea-lion	T	Y	N
	Martes pennanti pacifica	Pacific fisher	C	N	N
*	*Megaptera novaengliae*	humpback whale	E	N	N
*	*Physeter macrocephalus*	sperm whale	E	N	N

Threatened and Endangered Species in Del Norte County

Type	Scientific Name	Common Name	Category	Critical Habitat	Documented on CRNWR?
Plants					
	Arabis macdonaldiana	McDonald's rock-cress	E	N	N
	Lilium occidentale	western lily	E	N	N
Invertebrates					
	Polites mardon	mardon skipper	C	N	N
	Speyeria zerene hippolyta	Oregon silverspot butterfly	T	Y	N
Fish					
	Eucyclogobius newberryi	tidewater goby	E	P	N
*	*Oncorhynchus kisutch*	S. OR/N. CA Coho salmon	T	Y	N
*	*Oncorhynchus tshawytscha*	CA coastal Chinook salmon	T	Y	N
Reptiles					
*	*Caretta caretta*	loggerhead turtle	T	N	N
*	*Chelonia mydas (incl. agassizi)*	green turtle	T	N	N
*	*Dermochelys coriacea*	leatherback turtle	E	Y	N
*	*Lepidochelys olivacea*	olive (=Pacific) ridley sea turtle	T	N	N
Birds					
	Brachyramphus marmoratus	marbled murrelet	T	P	nearby waters
	Charadrius alexandrinus nivosus	western snowy plover	T	P	N
	Coccyzus americanus	Western yellow-billed cuckoo	C	N	N
	Haliaeetus leucocephalus	bald eagle	T	N	N
	Pelecanus occidentalis	brown pelican	E	N	Y
	Phoebastris albatrus	short-tailed albatross	E	N	N
	Strix occidentalis caurina	northern spotted owl	T	Y	N
Mammals					
*	*Balaenoptera borealis*	sei whale	E	N	N
*	*Balaenoptera musculus*	blue whale	E	N	N
*	*Balaenoptera physalus*	fin whale	E	N	N

Type	Scientific Name	Common Name	Category	Critical Habitat	Documented on CRNWR?
*	*Eumetopias jubatus*	Steller (=northern) sea-lion	T	Y	Y
	Martes pennanti pacifica	Pacific fisher	C	N	N
*	*Megaptera novaengliae*	humpback whale	E	N	N
*	*Physeter macrocephalus*	sperm whale	E	N	N

(PE) Proposed Endangered Proposed in the Federal Register as being in danger of extinction
(PT) Proposed Threatened Proposed as likely to become endangered within the foreseeable future
(E) Endangered Listed in the Federal Register as being in danger of extinction
(T) Threatened Listed as likely to become endangered within the foreseeable future
(C) Candidate Candidate which may become a proposed species
Critical Habitat Y = Designated, P = Proposed, N = None Designated
** Denotes a species Listed by the National Marine Fisheries Service*

Appendix J: Plant Lists

Humboldt Bay Flora

Species	Name Changes	Common Name	Habitat (specific)	Habitat (broad)			Status	On Refuge
				UD	PW	EW		
Aceraceae								
Acer macrophyllum Pursh		big leaf maple	FS		X		N	X
Agavaceae								
Cordyline australis Hook. F.		cabbage tree	FM, BM				E	
Aizoaceae								
Carpobrotus chilensis (Molina) N.E. Br.		sea fig	DM	X			E	X
Carpobrotus edulis (L.) N.E. Br.		Iceplant	DM	X			E, I	X
Alismataceae								
Alisma lanceolatum With.		lanceleaf water plantain	FM		X		E	
Alisima plantago-aquatica L.		water plantain	FM		X		N	
Anacardiaceae								
Toxicodendron diversilobum Torrey & A. Gray (E. Greene)		poison oak	CDF, RF	X	X		N	X
Apiaceae								
Angelica lucida L.		seacoast angelica	BM		X	X	N, C	X
Anthriscus caucalis M. Bieb		bur chevril	DM	X			E	
Cicuta douglasii (DC.) J. Coulter & Rose		western water hemlock	FM		X		N	
Conium maculatum L.		poison hemlock	RF, AW		X		I	X
Daucus carota L.		Queen Anne's lace	AW, DM	X	X		I	X
Daucus pusillus Michaux		American wild carrot	DM, SW	X	X		N	X
Foeniculum vulgare Miller		sweet fennel	AW, FM, SW	X	X		I	X
Glehnia littoralis (A. Gray) Miq. ssp. leiocarpa (Mathias) Hultén		American silvertop	DM	X			N, C	X
Heracleum lanatum Michaux	*Heracleum maximum* Bartram	Cow parsnip	FM, AW		X		N	X
Hydrocotyle ranunculoides L.f.		marsh pennywort	FM		X		N	X

Species	Name Changes	Common Name	Habitat (specific)	Habitat (broad)			Status	On Refuge
				UD	PW	EW		
Lilaeopsis occidentalis J. Coulter & Rose		western lilaeopsis	BM, SW		X	X	N	X
Oenanthe sarmentosa J.S. Presel		water parsely	FM, BM, FS, RF		X		N	X
Sanicula arctopoides Hook. & Arn.		footsteps of spring	DM	X	X		N	
Sanicula crassicaulis DC.		Pacific sanicle	CDF	X			N	X
Torilis arvensis (Hudson) Link		spreading hedge-parsley	CDF	X			E	
Apocynaceae								
Vinca major L.		bigleaf periwinkle	DM, FM, CDF, DS	X	X		E, I	X
Aquifoliaceae								
Ilex aquifolium L.		English holly	CDF	X	X		E, I	X
Araceae								
Lysichiton americanus Hultén & St. John		yellow skunk cabbage	RF, FS		X		N	X
Zantedeschia aethiopica (L.) Sprengel		callalily	FM, DM, DS	X	X		E, I	
Araliaceae								
Hedera helix L.		English ivy	CDF, RF	X	X		E, I	X
Asteraceae								
Achillea millefolium L.		common yarrow	DM, CDF, SW	X	X		N	X
Ambrosia chamissonis (Less.) E. Greene		beach-bur	DM, DS	X			N	X
Anaphalis margaritacea (L.) Benth. & Hook.		pearly everlasting	CDF, DM, SW	X	X		N	X
Anthemis arvensis L.		corn chamomile	DM				E	
Anthemis cotula L.		mayweed	AW, FM		X		E, I	X
Arctotheca calendula (L.) Levyns		cape weed	CDF,FS	X	X		E,I	
Artemisia pycnocephala DC.		coastal sagewort	DM	X			N	X
Aster chilensis Nees	*Symphyotrichum chilense* (Nees) G.L. Nesom var. *chilense*	common California aster	SW, BM, FM		X		N	X

Species	Name Changes	Common Name	Habitat (specific)	Habitat (broad)			Status	On Refuge
				UD	PW	EW		
Baccharis douglasii DC.		saltmarsh baccharis	BM, FM		X	X	N	X
Baccharis pilularis DC.		coyote brush	DM, AW, BM, FM, FS, RF	X	X	X	N	X
Bellis perennis L.		lawn daisy	AW		X		E	X
Bidens cernua L. var. *cernua*		nodding beggartick	FM, BM		X		N	X
Chamomilla suaveolens (Pursh) Rydb.	*Matricaria discoidea* D.C.	pineapple weed	AW, CDF, R	X	X		E	X
Chrysanthemum segetum L.	*Glebionis segetum* (L.) Fourr.	corn chrysanthemum	DM	X			E, I	
Cichorium intybus L.		chicory	AW		X		E	
Cirsium arvense (L.) Scop.		Canada thistle	AW		X		E, I	X
Cirsium vulgare (Savi) Ten.		bullthistle	SW, DM, AW, FM		X		E, I	X
Conyza canadensis (L.) Cronq.		Canada horseweed	DM, CDF, AW	X	X		E, I	X
Conyza floribunda Kunth		asthmaweed	CDF, DM, AW	X	X		E	X
Cotula australis (Sieber) Hook. f.		Australian waterbuttons	DM, DS	X			E	
Cotula coronopifolia L.		brass buttons	BM, SM		X	X	E	X
Crepis capillaris (L.) Wallr.		hawksbeard	AW		X		E,I	
Erechtites glomerata (Poiret) DC.		cutleaf burnweed	DM, SW, FM, DS, RF, CDF	X	X		E, i	X
Erechtites minima (Poiret) DC.		coastal burnweed	CDF, DM, BM, FM, DS, RF	X	X		E, I	X
Erigeron glaucus Ker-Gawler		seaside daisy	DM, DS	X			N	X
Euthamia occidentalis Nutt.		western flat-topped goldenrod	FM		X		N	X
Gnaphalium purpureum L.	*Gamochaeta purpurea* (L.) Cabrera	purple cudweed	DM	X			N	X
Gnaphalium palustre Nutt.		western marsh cudweed	SW, DM, AW	X	X		N	X
Gnaphalium ramosissimum Nutt.	*Pseudognaphalium ramosissimum* (Nutt.) Anderb.	pink cudweed	CDF	X			N	X

Species	Name Changes	Common Name	Habitat (specific)	Habitat (broad)			Status	On Refuge
				UD	PW	EW		
Gnaphalium stramineum Kunth.	*Pseudognaphalium stramineum* (Kunth) Anderb.	cotton-batting plant	DM, SW, AW	X	X		N	X
Grindelia stricta DC. var. stricta		coastal gumplant	SM, BM			X	N	X
*Hesperevax sparsiflora (*A. Gray) E. Greene var. *brevifolia*		shortleaf dwarf-cudweed	DM	X			N, C	
Hieracium albiflorum Hook.		white hawkweed	CDF	X			N	X
Hypochaeris glabra L.		smooth cat's ear	FM, DM, SW	X	X		E	X
Hypochaeris radicata L.		rough cat's ear	DM, CDF, AW	X	X		E	X
Jaumea carnosa (Less.) A. Gray		marsh jaumea	SM			X	N	X
Layia carnosa (Nutt.) Torrey & A. Gray		beach layia	DM	X			N, C	X
Leontodon taraxacoides (Villars) *Mérat* ssp. *taraxacoides*		lesser hawkbit	SW, DM, BM, FM, DS, AW	X	X		E, I	X
Lessingia filaginifolia (Hook & Arn.)	*Corethrogyne filaginifolia* (Hook & Arn.) Nutt var. *californica*	California sand-aster	DM	X			N	X
Leucanthemum vulgare Lam.		oxe-eye daisy	FM, DM, AW	X	X		E, I	X
Madia sativa Molina		coast tarweed	SW, BM, DM	X	X		N	X
Petasites frigidus (L.) Fries var. *palmatus* (Aiton) Cronq.		coltsfoot	RF		X		N	
Picris echioides L.		bristly oxtongue	FM, CDF, AW	X	X		E, I	X
Senecio vulgaris L.		old man of spring	DM, DS	X			E	X
Senecio elegans L.		purple ragwort	DM, DS	X			E, I	X
Senecio jacobaea L.		tansy ragwort	BM	X	X		E,I	
Senecio mikanioides Walp.	*Delairea odorata* Lem.	Cape ivy	DM, FS	X	X		E	
Senecio sylvaticus L.		woodland ragwort	CDF, AW	X	X		E, I	X
Silybum marianum (L.) Gaetner		milkthistle	AW		X		E, I	
Solidago canadensis L. ssp. elongata (Nutt.) Keck		meadow goldenrod	BM		X		N	X

Species	Name Changes	Common Name	Habitat (specific)	Habitat (broad)			Status	On Refuge
				UD	PW	EW		
Solidago spathulata DC. ssp. *spathulata*		dune goldenrod	DM, CDF	X			N	X
Soliva sessilis Ruiz & Pavon		field burnweed	DM, CDF	X			E, I	
Sonchus asper ssp. *asper* (L.) Hill		spiny sow-thistle	AW, DS, CDF		X		E, I	X
Sonchus oleraceus L.		common sow thistle	DM, AW	X	X		E, I	X
Tanacetum camphoratum Less.		dune tansy	DM	X			N	X
Taraxacum officinale Wigg.		red-seeded dandelion	AW		X		E	X
Azollaceae								
Azolla filiculoides Lam.		Pacific mosquito fern	FM, SW, OW		X		N	X
Azolla mexicana C. Presl		Mexican mosquito fern	OW, FM		X		N	X
Betulaceae								
Alnus rubra Bong.		red alder	RF, FS, SW		X		N	X
Boraginaceae								
Amsinckia spectabilis Fischer & C. Meyer var. *spectabilis*		seaside fiddleneck	DM	X		X	N	X
Borago officinalis L.		common borage	AW		X		E	
Cryptantha leiocarpa (Fischer & C. Meyer) E. Greene		coastal cryptantha	DM	X			N	X
Myosotis discolor Pers.		forget-me-not	AW, FM		X		E	
Symphytum asperum Lepchin		rough comfrey	AW		X		E	
Brassicaceae								
Barbarea vulgaris R. Br.		common wintercress	AW		X		E	
Brassica rapa L.		common mustard	AW, FM		X		E, I	X
Cakile edentula (Bigelow) Hook.		American sea rocket	DM	X			E	X
Cakile maritima Scop.		European sea rocket	DM	X			E	X
Capsella bursa-pastoris (L.) Medikus		shepherd's purse	DM, DS, AW	X	X		E	X
Cardamine oligosperma Torrey & Gray		bitter cress	DM, AW, DS, SW	X	X		N	X

Species	Name Changes	Common Name	Habitat (specific)	Habitat (broad)			Status	On Refuge
				UD	PW	EW		
Coincya monensis (L.) Greuter & Burdet		star-mustard	DM	X			E,I	
Draba verna L.		small fruiting spring draba	DM, SW	X	X		N	
Erysimum menziesii (Hook) ssp. *eurekense* R.A. Price		Humboldt Bay wallflower	DM	X			N, C	X
Hirschfeldia incana (L.) Lagr.-Fossat		shortpod mustard	DM, AW	X	X		E,I	X
Lepidium nitidum Torrey & A. Gray var. *nitidum*		shining pepperweed	DM	X			N	X
Lobularia maritima (L.) Desv.		sweet alyssum	DS	X			E	
Raphanus raphanistrum L.		wild radish	DM, AW, RF	X	X		E	X
Rorippa nasturtium-aquaticum (L.) Hayek	*Nasturtium officinale* W.T. Aiton	water cress	FM, RF		X		N	
Sisymbrium officinale L.		hedge mustard	AW, CDF	X	X		E, I	X
Callitrichaceae								
Callitriche heterophylla (Pursh) var. *bolanderi* (Hegelm.) Fassett		water starwort	DS, AW, FM	X	X		N	
Callitriche stagnalis Scop.		pond water-starwort	OW, FM		X		E	
Caprifoliaceae								
Linnaea borealis L. var. *longiflora* Torrey	*Linnaea borealis* L. ssp. *longiflora* (Torrey) Hultén	twin flower	CDF	X			N	planted
Lonicera hispidula Douglas var. *vacillans* A. Gray		pink honeysuckle	CDF, RF	X			N	X
Lonicera involucrata (Richardson) Banks var. *ledebourii* (Eschsch.) Zabel		coast twinberry	CDF, FS, RF	X	X		N	X
Sambucus racemosa L.		red elderberry	RF, CDF, FS	X	X		N	X
Caryophyllaceae								
Cardionema ramosissimum (J. A. weinm.) Nelson & J.F. Macbr.		sandmat	DM, DS	X			N	X

Species	Name Changes	Common Name	Habitat (specific)	Habitat (broad)			Status	On Refuge
				UD	PW	EW		
Cerastium glomeratum Thuill.		sticky chickweed	DM, DS, SW, AW, FM	X	X		E	X
Polycarpon tetraphyllum (L.) L.		four-leaved manyseed	DM	X			E	
Sagina decumbens (Elliot) Torrey & Gray ssp. *occidentalis* (S. Watson) G. Crow		western pearlwort	SW		X		N	X
Sagina procumbens L.		birdeye pearlwort	AW		X		E	
Silene gallica L.		common catchfly	DM	X			E	X
Spergula arvensis L. ssp. *arvensis*		spurry	DM, DS, FM	X	X		E	
Spergularia canadensis (Pers.) G. Don var. *occidentalis* R. Rossbach		western sand-spurrey	BM, SM		X	X	N, C	X
Spergularia marina (L.) Griseb.	*Spergularia salina* (L.) (Griseb.) J. Presl & C. Presl	salt marsh sand spurrey	SM, BM, AW		X	X	N	X
Spergularia macrotheca (Hornem.) Heynh. var. *macrotheca*		sticky sand spurrey	SM, SW		X	X	N	X
Spergularia rubra (L.) J.S. Presl. & C. Presl.		red sand spurry	BM, AW		X		E	
Stellaria nitens Nutt.		northern starwort	BM, SW		X		N	X
Stellaria longipes Goldie. var. *longipes*		meadow starwort	FM		X		N	
Stellaria media L. Villars		common chickweed	AW, DM, FM, DS, SW	X	X		E	X
Chenopodiaceae								
Atriplex leucophylla (Moq.) D. Dietr.		beach salt bush	DM, SM	X		X	N	
Atriplex patula L.		spear saltbush	BM, SM			X	N	X
Atriplex triangularis Willd.	*Atriplex prostrata* Bouchér ex DC.	triangle oracle	BM, SM, AW		X	X	E, I	X
Chenopodium album L.		lamb's quarters	DM, CDF, BM	X	X		E, I	X
Chenopodium ambrosioides L.		Mexican tea	R, CDF	X	X		E, I	X
Chenopodium foliosum (Moench) Asch.		leafy goosefoot	BM, AW		X	X	E, I	

Species	Name Changes	Common Name	Habitat (specific)	Habitat (broad)			Status	On Refuge
				UD	PW	EW		
Salicornia bigelovii Torrey		dwarf saltwort	SM			X	N	range extension
Salicornia virginica L.	*Sarcocornia pacifica* (Standl.) A.J. Scott	common pickleweed	SM, BM, AW		X	X	N	X
Convolvulaceae								
Calystegia soldanella (L.) R. Br.		beach morning-glory	DM	X			N	X
Calystegia silvatica (Kit.) griseb. ssp. *disjuncta* Brummitt		shortstalk false bindweed	RF, FS, AW		X		E, I	X
Convolvulus arvensis L.		field bindweed	AW, FM		X		E	X
Crassulaceae								
Crassula connata (Ruiz Lopez & Pavon)		sand pygmy-weed	DM				N	X
Cucurbitaceae								
Marah oreganus (Torrey & A. Gray) Howell		coast wild-cucumber	CDF, RF	X	X		N	
Cupressaceae								
Cupressus macrocarpa Gordon		Monterey cypress	CDF, AW, DM	X	X		E	X
Thuja plicata D. Don		red cedar	RF		X		N	
Cuscutaceae								
Cuscuta salina Engelm. var. *major* Yuncker		saltmarsh dodder	SM, BM		X	X	N	X
Cyperaceae								
Carex cusickii Mackenzie		Cusick's sedge	FS		X		N	
Carex deweyana Schwein. ssp. *leptopoda* (Mackenzie) Calder & R. Taylor	*Carex leptopoda* Mack.	Dewey's taper-fruit sedge	CDF				N	
Carex lyngbyei Hornem		Lyngbye's sedge	BM, SM		X	X	N, C	X
Carex obnupta L. Bailey		slough sedge	SW, FM		X		N	X
Carex pansa L. Bailey		sand-dune sedge	SW, DM	X	X		N	X

Species	Name Changes	Common Name	Habitat (specific)	Habitat (broad)			Status	On Refuge
				UD	PW	EW		
Cyperus eragrostis Lam.		tall flatsedge	FM, SW, BM, DM, R	X	X	X	N	X
Eleocharis macrostachya Britton		common spikerush	SW, FM		X		N	X
Eleocharis pachycarpa Desv.		broad-fruit spikerush	FM		X		E	
Eleocharis parvula (Roemer & Schultes) Link		small spikerush	FM		X		N C	
Scirpus acutus Bigelow var. *occidentalis* (S. Watson) Beetle	*Schoenoplectus acutus* (Muhl. ex Bigelow) A Löve & D. Löve var. *occidentalis* (S. Watson) S.G. Sm.	hard-stemmed tule	FM, BM		X	X	N	X
Scirpus americanus Pers.	*Schoenoplectus americanus* (Pers.) Volkart ex Schinz & R. Keller	bulrush	FM, BM		X	X	N	
Scirpus cernuus (Roemer & Schultes) Vahl.	*Isolepis cernua (Vahl)* Roem. & Schult.	low clubrush	SW, FM, BM, SM		X	X	N	X
Scirpus microcarpus C. Presl		small-fruited bulrush	FM, RF		X		N	X
Scirpus maritimus L.	*Schoenoplectus maritimus* (L.) Lye	seacoast bulrush	BM		X	X	N	X
Scirpus pungens Vahl	*Schoenoplectus pungens* (Vahl) Palla var. *badius* (J. Presl & C. Presl) S.G. Sm.	three-square	FM, BM		X	X	N	X
Scirpus robustus Pursh	*Schoenoplectus robustus* (Pursh) M.T. Strong	sturdy bulrush	BM		X	X	N	
Dennstaedtiaceae								
Pteridium aquilinum (L.) Kuhn var. *pubescens* L.		western bracken fern	CDF, DM, DS	X			N	X
Dipsicaceae								
Dipsacus fullonum L.		wild teasel	AW, FM		X		E, I	
Dryopteridaceae								
Dryopteris arguta (Kaulf.) Maxon		coastal wood fern	RF, FM, FS		X		N	X
Polystichum munitum (Kaulf.) C. Presl		sword fern	CDF, RF	X	X		N	X

Species	Name Changes	Common Name	Habitat (specific)	Habitat (broad)			Status	On Refuge
				UD	PW	EW		
Equisetaceae								
Equisetum arvense L.		common horsetail	FM, RF		X		N	
Equisetum laevigatum A. Braun		smooth scouring-rush	RF, SW		X		N	
Equisetum telmateia Ehrh. ssp. *Braunii* (Milde) R.L.Hauke		giant horsetail	FM, RF, AW, CDF	X	X		N	X
Ericaceae								
Allotropa virgata A. Gray		sugar-stick	CDF	X			N	X
Arbutus menziesii Pursh		Pacific madrone	CDF	X			N	X
Arctostaphylos columbiana Piper		hairy manzanita	CDF	X			N	X
Arctostaphylos uva-ursi (L.) Sprengel		bearberry	CDF, DM	X			N	X
Arctostaphylos x *media* E. Greene		hybrid manzanita	CDF	X			N	X
Chimaphila umbellata (L.) Bartram		pipsissewa	CDF	X			N	X
Erica lusitanica Rudolphi		Spanish heath	FM/FS		X		E,I	
Gaultheria shallon Pursh		salal	CDF	X			N	X
Pyrola picta Smith		white-veined wintergreen	CDF	X			N	X
Vaccinium ovatum Pursh		evergreen huckleberry	CDF, FS	X	X		N	
Fabaceae								
Acacia dealbata Link		silver wattle	FS, CDF	X	X		E, I	
Cytisus scoparius (L.) Link		scotch broom	CDF, RF, FS, DS, SW	X	X		E, I	X
Genista monspessulana (L.) L. Johnson		French broom	FS		X		E, I	
Lathyrus latifolius (L.)		perennial sweet pea	BM, DM	X	X		E	
Lathyrus littoralis (Nutt.) Endl.		silky beach pea	DM	X			N	
Lathyrus palustris L.		marsh pea	FS, FM		X		N, C	
*Lathyrus vestitus*Nutt.var. *vestitus*		hillside pea	CDF	X			N	X
Lotus corniculatus L.		bird's-foot trefoil	FM, SW, AW		X		E, I	X

Species	Name Changes	Common Name	Habitat (specific)	Habitat (broad)			Status	On Refuge
				UD	PW	EW		
Lotus formosissimus E. Greene		coastal lotus	FM, FS		X		N	
Lotus micranthus Benth.		small-flowered lotus	DM, SW	X	X		N	X
Lotus purshianus (Benth.) Clements & E.G. Clements var. *purshianus*	*Lotus unifoliatus* (Hook) Benth. var. *unifoliatus*	American bird's-foot trefoil	SW, DM	X	X		N	X
Lotus uliginosus Schk.	*Lotus pedunculatus* Cav.	big trefoil	AW, FM		X		E, I	X
Lupinus arboreus Sims		yellow bush lupine	DM, DS	X			E,I	X
Lupinus bicolor Lindley		miniature lupine	DM	X			N	X
Lupinus littoralis Douglas		seashore lupine	DM	X			N	X
Lupinus polyphyllus Lindley var. *polyphyllus*		bigleaf lupine	AW		X		N	
Lupinus rivularis Lindley		riverbank lupine	AW, DM, DS	X	X		N	X
Medicago polymorpha L.		bur-clover	DS, BM, DM	X	X		E	X
Melilotus alba Medikus	*Melilotus officinalis* (L.) Lam.	yellow sweetclover	DM, DS, AW	X			E	X
Melilotus officinalis (L.) Pall.		yellow sweetclover	DM. DS, AW	X			E	X
Trifolium arvense L.		rabbitfoot clover	DM, DS	X			E	
Trifolium campestre Schreber		hop clover	DM, DS	X			E	
Trifolium dubium Sibth.		shamrock	DM, DS, CDF, AW	X	X		E, I	
Trifolium fragiferum L.		strawberry clover	AW		X		E, I	X
Trifolium glomeratum L.		clustered clover	CDF	X			E	X
Trifolium hirtum All.		rose clover	DM, DS	X			E	
Trifolium macraei Hook. & Arn.		Macrae's clover	DM	X			N	X
Trifolium microcephalum Pursh		small-headed clover	DM	X			N	X
Trifolium microdon Hook. & Arn.		thimble clover	DM	X			N	X
Trifolium pratense L.		red clover	AW		X		E	X
Trifolium repens L.		white clover	AW, SW		X		E, I	X
Trifolium subterraneum L.		subterranean clover	SW, AW		X		E, I	X
Trifolium wormskioldii Lehm.		coast clover	SW, AW, FM		X		N	X
Vicia benghalensis L.		purple vetch	DM, DS, BM	X	X	X	E, I	X

Species	Name Changes	Common Name	Habitat (specific)	Habitat (broad)			Status	On Refuge
				UD	PW	EW		
Vicia gigantea Hook.	*Vicia nigricans* Hook. & Arn. ssp. *gigantea* (Hook.) Lassetter & C.R. Gunn.	giant vetch	FS, RF		X		N	X
Vicia hirsuta (L.) S.F. Gray		hairy vetch	CDF, DM, DS	X			E	X
Vicia sativa L. ssp. *sativa*		spring vetch	FM, RF		X		E	
Vicia sativa L. ssp. *nigra* (L.)		common vetch	AW, DM		X		E	X
Vicia villosa Roth ssp. *villosa*		hairy vetch	CDF	X			E, I	X
Garryaceae								
Garrya elliptica Lindley		coast silk tassel	CDF	X			N	X
Gentianaceae								
Centaurium davyi (Jepson) Abrams		Davy's centaury	BM			X	N	
Centaurium muehlenbergii (Griseb.)		Muhlenberg's centaury	FM, SW		X		N	X
Geraniaceae								
Erodium botrys (Cav.) Bertol.		long-beaked filaree	DS, DM	X			E	
Erodium cicutarium (L.) L'Hér.		red-stemmed filaree	AW, DM	X	X		E	
Geranium dissectum L.		cutleaf geranium	AW		X		E	X
Geranium molle L.		dove's-foot geranium	AW, DM, DS	X	X		E	
Geranium robertianum L.		Robert's geranium	RF, FS		X		E, I	
Grossulariaceae								
Ribes divaricatum Douglas var. *pubiflorum* Koehne		spreading gooseberry	CDF	X			N	X
Ribes laxiflorum Pursh		trailing black currant	CDF	X			N	X
Ribes sanguineum Pursh var. *glutinosum* (Benth)		pink-flowering currant	CDF, FS, RF	X	X		N	X
Guttiferae								
Hypericum anagalloides Cham. & Schdl.		tinker's penny	AW, FM		X		N	
Hypericum perforatum L.		common St. Johnswort	DM, DS, BM	X	X	X	E, I	

Species	Name Changes	Common Name	Habitat (specific)	Habitat (broad)			Status	On Refuge
				UD	PW	EW		
Hippuridaceae								
Hippuris vulgaris L.		common mares-tail	FM		X		N	
Hydrocharitaceae								
Egeria densa Planchon		Brazilian elodea	OW		X		E, I	
Iridaceae								
Crocosmia xcrocosmiiflora (Burb. & Dean) N.E. Br.		monbretia	DM, DS, FM	X	X		E, I	
Iris douglasiana Herbert		Douglas Iris	CDF, FM	X	X		N	
Iris germanica L. var. *florentina* (L.) Dykes		orris-root	DS	X			E	
Iris pseudacorus L.		water iris	FM		X		E	
Sisyrinchium bellum S. Watson		blue-eyed grass	FM		X		N	
Sisyrinchium californicum (Ker Gawler) Dryander		California golden-eyed grass	SW, FM		X		N	X
Juncaceae								
Juncus ambiguus Guss.		saline toad rush	BM, SM,		X	X	N	
Juncus articulatus L.		joinleaf rush	FM		X		N	
Juncus balticus Willd.	*Juncus arcticus* Willd. ssp. *littoralis* (Engelm.) Hultén	Baltic rush	SM, BM		X	X	N	
Juncus bolanderi Engelm.		Bolander's rush	AW, FM		X		N	X
Juncus breweri Engelm.		Brewer's rush	SW, DM	X	X		N	X
Juncus bufonius L. var. *bufonius*		toad rush	SW, AW, FM		X		N	X
Juncus bufonius L. var. *occidentalis F.J. Herm*		western toad rush	DM, SW	X	X		N	X
Juncus effusus L. var. *brunneus* Engelm.		bog rush	AW, FM		X		N	X
Juncus effusus L. var. *pacificus* Fern. & Wieg.		Pacific Bog Rush	AW		X		N	X
Juncus ensifolius Wikstrom		three-stamened rush	AW, FM		X		N	

Species	Name Changes	Common Name	Habitat (specific)	Habitat (broad)			Status	On Refuge
				UD	PW	EW		
Juncus falcatus E. Meyer var. *falcatus*		sickle-leafed rush	SW	X			N	X
Juncus gerardii Loisel.		salt-meadow rush	SM		X		E	
Juncus lesueurii Bolander		salt rush	BM, SM		X	X	N	X
Luzula comosa E. Meyer		common wood-rush	CDF, DM, DS	X			N	X
Luzula subcongesta (S. Watson) Jepson		Donner wood rush	CDF, DM				N	X
Juncaginaceae								
Lilaea scilloides (Poiret) Hauman		flowering quillwort	SM, BM			X	N	
Triglochin concinna var. *concinna* Burtt Davy	*Triglochin maritima* L.	arrow-grass	SM			X	N	X
Triglochin maritima L.		seaside arrow-grass	BM, SM		X	X	N	X
Triglochin striata Ruiz Lopez & Pavon		three-ribbed arrow-grass	BM, FM		X		N	X
Lamiaceae								
Lamium purpureum L.		purple dead-nettle	FM, DM, DS	X	X		E	X
Mentha pulegium L.		pennyroyal	SW, AW, FM		X		E, I	X
Prunella vulgaris L. ssp. *vulgaris*		self-heal	AW		X		E	
Satureja douglasii (Benth.) Briq.		yerba buena	CDF	X			N	X
Stachys chamissonis Benth.		coast hedge-nettle	RF, FS		X		N	X
Stachys ajugoides Benth. var. *rigida* Jepson & Hoover	*Stachys rigida* Nutt. ex Benth. var. *rigida*	rigid hedge-nettle	FM, BM, RF, SW, AW		X		N	X
Lemnaceae								
Lemna minuscula Herter	*Lemna minuta* Kunth	least duckweed	OW, FM		X		N	X
Liliaceae								
Allium triquetrum L.		three-cornered leek	FS, FM, DM	X	X		E	
Allium unifolium Kellogg		one-leaf onion	CDF	X			N	X
Amaryllis belladonna L.		belladonna lily	DS, AW	X	X		E	
Brodiaea coronaria (Salisb.) Engl.		early harvest brodiaea	DM, CDF	X			N	X

Species	Name Changes	Common Name	Habitat (specific)	Habitat (broad)			Status	On Refuge
				UD	PW	EW		
Dichelostemma capitatum (Benth.) A.W. Wood		blue dicks	DM , CDF	X			N	X
Dichelostemma congestum (Sm.) Kunth		fork-toothed ookow	CDF	X			N	X
Fritillaria affinis (Schultes) Sealy var. *affinis*		checker lily	CDF	X			N	X
Maianthemum dilatatum (Alph. Wood) Nelson & J.F. Macbr.		false lily of the vally	CDF, RF	X	X		N	X
Muscari botryoides (L.) Miller		common grape hyacinth	CDF	X			E	
Narcissus pseudonarcissus		daffodil	AW, DS, SW	X	X		E	X
Triteleia hyacinthina (Lindley) E. Greene		white brodiaea	DM, CDF	X			N	X
Linaceae								
Linum bienne Miller		narrow-leaved flax	DM, FM, BM	X	X		E	
Lythraceae								
Lythrum hyssopifolium L.		hyssop loosestrife	SW, AW, FM		X		E, I	X
Malvaceae								
Malva neglecta Wallr.		common mallow	AW		X		E	X
Myrtaceae								
Eucalyptus globulus Labill.		blue gum	RF, AW, CDF		X		E	X
Myricaceae								
Myrica californica Cham.	*Morella californica* (Cham.) Wilbur	wax myrtle	CDF, RF, FS, SW	X	X		N	X
Nyctaginaceae								
Abronia latifolia Eschsch		yellow sand verbena	DM	X			N	X
Abronia umbellata Lam. ssp. *breviflora* (Standley) Munz		pink sand verbena	DM	X			N, C	X
Nymphaeaceae								
Nuphar luteum (L.) Sibth. & Sm. ssp. *polysepalum* (Engelm.) E. Beal		yellow pond-lily	FM		X		N	X

Species	Name Changes	Common Name	Habitat (specific)	Habitat (broad)			Status	On Refuge
				UD	PW	EW		
Onagraceae								
Camissonia cheiranthifolia (Sprengel) Raim ssp. *cheiranthifolia*		beach-primrose	DM	X			N	X
Camissonia strigulosa (Fischer & C. Meyer) Raven		strigose sun-cup	CDF, DM	X			N	X
Clarkia davyi (Jespon) Harlan Lewis & M. Lewis		Davy's clarkia	DM, DS	X			N	X
Clarkia purpurea (Curtis) Nelson & J.F. Macbr ssp. *quadrivulnera* (Douglas) Harlan Lewis & M. Lewis		purple clarkia	SW		X		N	X
Epilobium angustifolium L. ssp. *circumvagum* Mosq.	*Chamerion angustifolium* (L.) Holub ssp. *circumvagum* (Mosquin) Hoch	fireweed	FM, RF		X		N	X
Epilobium ciliatum Raf. ssp. *watsonii* (Barbey) P. Hoch & Raven		Watson's willowherb	SW, FM, BM, AW		X	X	N	X
Fuchsia magellanica Lam.		hardy fuchsia	FS		X		E	
Oenothera glazioviana Micheli		red-sepaled evening-primrose	DM, DS, FM	X	X		E, I	
Ophioglossaceae								
Botrychium multifidum (S. Gmelin) Rupr.		common grapefern	FM, FS, SW		X		N	X
Orchidaceae								
Calypso bulbosa (L.) Oakes		fairy slipper	CDF	X	X		N	X
Corallorhiza maculata Raf.		summer coral root	CDF	X			N	X
Goodyera oblongifolia Raf.		rattlesnake plantain	CDF	X			N	X
Listera cordata (L.)		heart-leaved twayblade	CDF	X			N	X
Piperia elegans (Lindley) Rydb.		coast piperia	SW, CDF	X	X		N	X
Piperia transversa Suksd.		rein orchid	CDF	X			N	X
Spiranthes romanzoffiana Cham.		hooded ladies-tresses	SW, CDF	X	X		N	X

Species	Name Changes	Common Name	Habitat (specific)	Habitat (broad)			Status	On Refuge
				UD	PW	EW		
Oxalidaceae								
Oxalis corniculata L.		creeping woodsorrel	FS, DS	X	X		E	X
Oxalis pes-caprae L.		Bermuda buttercup	DM, DS	X			E, I	
Oxalis rubra A. St. Hil.		red oxalis	DM, DS	X			E, I	
Papaveraceae								
Eschscholzia californica Cham.		California poppy	AW, DM	X	X		N	X
Fumaria officinalis (L.)		fumitory	AW		X		E	
Platystemon californicus Benth.		cream cups	DM, DS	X			N	X
Pinaceae								
Abies grandis (Douglas) Lindley		grand fir	CDF, RF	X	X		N	X
Picea sitchensis (Bong.) Carriere		Sitka spruce	CDF, FS, SW	X	X		N	X
Pinus contorta ssp. *contorta* Loudon	*Pinus contorta* Douglas ex Louden var. *contorta*	shore pine	CDF, SW	X	X		N	X
Pinus radiata D. Don		Monterey pine	AW, CDF	X	X		E	X
Pseudotsuga menziesii (Mirbel) Franco var. *menziesii*		Douglas-fir	CDF	X			N	X
Pittosporaceae								
Pittosporum tenuifolium Gaertner		short-leaf box	CDF	X			E, I	X
Plantaginaceae								
Plantago coronopus L.		cut-leaf plantain	DM, SW	X	X		E	
Plantago erecta E. Morris		California plantain	DM, SW, DS	X	X		N	X
Plantago lanceolata L.		narrow-leaved plantain	CDF, DM, AW	X	X		E	X
Plantago major L.		common plantain	SW, AW, FM		X		E	
Plantago maritima L.		maritime plantain	SM			X	N	X
Plantago subnuda Pilger		tall coastal plantain	AW, SW, FM		X		N	
Plumbaginaceae								
Armeria maritima (Miller) Willd. ssp. *californica* (Boiss.)		California sea-pink	DM, DS	X			N	X

Species	Name Changes	Common Name	Habitat (specific)	Habitat (broad)			Status	On Refuge
				UD	PW	EW		
Limonium californicum (Boiss.) *A.A. Heller*		western marsh-rosemary	SM			X	N	X
Poaceae								
Agrostis exarata Trin.		spike bentgrass	AW, BM		X		N	X
Agrostis hallii Vasey		Hall's bentgrass	CDF	X			N	X
Agrostis microphylla Steudel		little-leaf bentgrass	SW	X			N	X
Agrostis stolonifera L.		creeping bentgrass	BM, AW, FM		X		E, I	X
Agrostis viridis Gouan		green bentgrass	AW, BM	X	X		E	X
Aira praecox L.		yellow hairgrass	DM, DS, SW	X	X		E, I	X
Aira caryophyllea L.		silver hairgrass	DM, DS, SW	X	X		E, I	X
Alopecurus aequalis Sobol.		short-awn foxtail	FM		X		N	X
Alopecurus geniculatus L.		water foxtail	FM, AW		X		N	X
Alopecurus pratensis L.		meadow foxtail	AW		X		E	
Ammophila arenaria (L.) Link		European beach grass	DM, DS	X			E, I	X
Anthoxanthum odoratum L.		sweet vernal grass	DM, DS, SW, AW, FS, CDF	X	X		E, I	X
Avena fatua L.		wild oats	AW, DM		X		E	
Avena sativa L.		common oats	AW		X		E	X
Briza maxima L.		big quaking grass	DM, DS, SW	X	X		E , I	X
Briza minor L.		little quaking grass	SW, FM		X		E	
Bromus carinatus Hook & Arn. var. *carinatus*		California brome	DM, DS	X			N	X
Bromus carinatus Hook & Arn. var. *carinatus*		mountain brome	DM	X			N	X
Bromus diandrus Roth		ripgut brome	DM, DS, SW	X			E, I	X
Bromus hordeaceus L.		soft chess	DM, BM , SW	X	X	X	E, I	X
Calamagrostis nutkaensis (C. Presl) Steudel		reedgrass	CDF, BM	X	X		N	X
Cortaderia jubata (Lemoine) Stapf		jubata grass	DM, SW, CDF, RF	X	X		E, I	X

Species	Name Changes	Common Name	Habitat (specific)	Habitat (broad)			Status	On Refuge
				UD	PW	EW		
Cortaderia selloana (Schultes) Asch & Graebner		pampas grass	DM	X			E, I	
Cynodon dactylon (L.) Pers.		bermuda grass	DM, DS, AW	X	X		E, I	
Cynosurus echinatus L.		dogtail grass	DM, DS, CDF	X			E, I	X
Dactylis glomerata L.		orchard-grass	CDF, AW	X	X		E, I	X
Deschampsia cespitosa (L.) Beauv. ssp. *holciformis* (C. Presel) W.E. Lawrx	*Deschampsia holciformis* J. Presl	coastal tufted hair-grass	BM,SM		X	X	N	X
Distichlis spicata (L.) E. Greene		saltgrass	SM, BM, SW, AW		X	X	N	X
Echinochloa crus-galli (L.) P. Beauv.		barnyard grass	FM		X		E, I	X
Elymus glaucus Buckley ssp. *jepsonii* (Burtt Davy) Gould		Jepson's blue wildrye	CDF, AW	X			N	
Festuca arundinacea Schreber	*Schedonorus phoenix* (Scop.) Holub	tall fescue	FM, BM, AW		X		E, I	X
Festuca occidentalis Hook.		western fescue	CDF	X			N	X
Festuca rubra L.		red fescue	DM, CDF	X			N	X
Glyceria elata (Nash) A. Hitchc.	*Glyceria striata* (Lam.) Hitchc.	tall mannagrass	FM		X		N	X
Glyceria occidentalis (Piper) J.C. Nelson		western mannagrass	FM, RF		X		N	X
Hierochloe occidentalis Buckley		western sweetgrass	CDF	X			N	X
Holcus lanatus L.		common velvetgrass	AW, SW, FM, CDF	X	X		E, I	X
Hordeum brachyantherum Nevski ssp. *brachyantherum*		meadow barley	BM			X	N	X
Hordeum jubatum L.		foxtail barley	BM, SM		X	X	N	X
Hordeum marinum Hudson ssp. *gussoneanum* (Parl.) Thell.		Mediterranean barley	AW, SM		X	X	E	
Hordeum murinum L. ssp. *glaucum* (Stuedel) Tzvelev		smooth barley	DM	X			E	
Hordeum murinum L. ssp. *murinum*		wall barley	DM, DS	X			E	

Species	Name Changes	Common Name	Habitat (specific)	Habitat (broad)			Status	On Refuge
				UD	PW	EW		
Leymus mollis (Trin.) Pilger ssp. *mollis*		dune wild-rye	DM	X			N	X
Leymus x*vancouverensis* (Vasey) Pilger		Vancouver wild-rye	AW, DM, BM	X	X	X	N	X
Lolium multiflorum Lam.	*Lolium perenne* L. ssp. *multiflorum* (Lam.) Husnot	Italian rye-grass	AW, RF		X		E, I	X
Lolium perenne L.		perennial ryegrass	AW, CDF	X	X		E	X
Parapholis incurva (L.) C.E. Hubb.		curved sicklegrass	SM			X	E	X
Parapholis strigosa (Dumort) C.E. Hubb.		hairy sickle grass	SM			X	E, I	X
Phalaris aquatica L.		Harding grass	FM, AW		X		E, I	X
Phalaris arundinacea L.		reed canarygrass	FM, AW, RF, FS		X		E, I	X
Phragmites australis (Cav.) Steudel		common reed	BM, SM		X	X	E, I	
Pleuropogon californicus (Nees) Vasey		semaphore grass	AW		X		N	
Poa annua L.		annual blue grass	CDF, DM, DS, AW	X	X		E	X
Poa confinis Vasey		coastline bluegrass	DM	X			N	X
Poa macrantha Vasey		large-flowered sand-dune blue grass	DM	X			N	X
Poa pratensis L. ssp. *pratensis*		Kentucky blue grass	CDF	X			E	X
Polypogon interruptus Kunth		ditch beard grass	AW, FM		X		E	X
Polypogon maritimus Willd.		Mediterranean beard grass	SW, FM		X		E, I	X
Polypogon monspeliensis (L.) Desf.		rabbitsfoot grass	SW, FM		X		E, I	X
Puccinellia nutkaensis (J.S. Presl.) Fern. & Weath.		Alaska alkali grass	SM			X	N	X
Spartina densiflora Brongn.		dense-flowered cordgrass	SM, BM		X	X	E, I	X
Torreyochloa pallida (J.S. Presl) Church var. *pauciflora* (J.S. Presl) J.I. Davis		weak mannagrass	FM		X		N	

Species	Name Changes	Common Name	Habitat (specific)	Habitat (broad)			Status	On Refuge
				UD	PW	EW		
Trisetum canescens Buckley		nodding oatgrass	CDF	X			N	X
Vulpia bromoides (L.) S.F. Gray		brome fescue	DM, DS	X			E, I	X
Vulpia myuros (L.) C. Gmelin		six-weeks fescue	CDF, R	X			E	X
Zea mays L.		corn	AW		X		E	
Polemoniaceae								
Gilia millefoliata Fischer & C. Meyer		dark-eyed gilia	DM	X			N, C	X
Navarretia squarrosa (Eschsch.) Hook. & Arn.		skunkweed	DM, AW	X	X		N	
Polygonaceae								
Eriogonum latifolium Smith		coast buckwheat	DM	X			N	X
Polygonum arenastrum Boreau	*Polygonum aviculare* Linnaeus ssp. *depressum* (Meisner) Arcangeli	common knotweed	AW		X		E	
Polygonum cuspidatum Sieb. & Zucc.	*Fallopia japonica* (Houttuyn) Ronse Decraene	Japanese knotweed	DM	X			E, I	
Polygonum hydropiperoides Michaux	*Persicaria hydropiperoides* (Michaux) Small	water pepper	FM		X		N	X
Polygonum lapathifolium L.	*Persicaria lapathifolia* (Linnaeus) Gray	willow weed	FM, AW		X		N	X
Polygonum paronychia Cham. & Schldl.		beach knotweed	DM, DS	X			N	X
Polygonum persicaria L.	*Persicaria maculosa* Gray	lady's thumb	AW, FM, BM, RF		X		E, I	X
Rumex acetosella L.		sheep sorrel	DM, DS,SW, CDF, RF	X	X		E, I	X
Rumex conglomeratus Murr.		green dock	AW		X		E	X
Rumex crispus L.		curly dock	FM, SW, AW, BM		X	X	E, I	X
Rumex maritimus L.		golden dock	BM		X	X	N	X
Rumex occidentalis S. Watson	*Rumex aquaticus* L. var. *fenestratus* (Greene) Dorn	western dock	FM, BM		X		N	X
Rumex pulcher L.		fiddle dock	AW		X		E	X

Species	Name Changes	Common Name	Habitat (specific)	Habitat (broad)			Status	On Refuge
				UD	PW	EW		
Rumex salicifolius J.A. Weinm.var. *crassus* (Rech.f.) J. Howell	*Rumex crassus* Rechinger f.	willow-leaved dock	SW, BM		X	X	N	X
Rumex salicifolius J.A. Weinm. var. *transitorius* (Rech.f.) J. Hickman	*Rumex transitorius* Rechinger f	willow dock	FM, BM		X		N	X
Polypodiaceae								
Athyrium filix-femina (L.) Roth var. *cyclosorum* Rupr.		lady fern	CDF, FS	X	X		N	X
Polypodium calirhiza S. Whitmore & A. R. Smith		licorice fern	CDF, DS	X			N	X
Polypodium scouleri Hook. & Grev.		leather-leaf fern	CDF	X			N	X
Portulacaceae								
Calandrinia ciliata (Ruíz Lopez & Pavón) DC.		red-maids	DM, DS, SW	X	X		N	X
Claytonia exigua Torrey & A. Gray ssp. *exigua*		little spring beauty	DM, DS	X			N	X
Claytonia perfoliata Willd. ssp. *perfoliata*		miner's lettuce	DM, DS, RF	X	X		N	X
Claytonia rubra (Howell) Tidestrom ssp. *depressa* (A. Gray) John M. Miller & Chambers		red-stemmed spring beauty	DM	X			N	X
Potamogetonaceae								
Potamogeton nodosus Poiret (x natans)		long-leaved pondweed	OW		X		N	
Potamogeton pectinatus L.	*Stuckenia pectinata* (L.) Böerner	fennel pondweed	OW		X		N	X
Ruppia maritima L.		ditch grass	SM, BM			X	N	X
Primulaceae								
Anagallis arvensis L.		scarlet pimpernel	FM, DM, BM, SW	X	X	X	E	
Glaux maritima L.		sea milk-wort	BM, SM		X	X	N	X

Species	Name Changes	Common Name	Habitat (specific)	Habitat (broad)			Status	On Refuge
				UD	PW	EW		
Pteridaceae								
Pentagramma triangularis (Kaulf.) G. Yatskievych, M.D. Windham & E. Wollenweber ssp. *triangularis*		gold-back fern	CDF, DM	X			N	X
Ranunculaceae								
Ranunculus muricatus L.		spiny buttercup	AW		X		E	
Ranunculus repens L.		creeping buttercup	FM, RF, AW		X		E	X
Rhamnaceae								
Rhamnus purshiana DC.	*Frangula purshiana* (DC.) Cooper	cascara	CDF	X			N	X
Rosaceae								
Aphanes occidentalis (Nutt.) Rydb.	*Aphanes arvensis* L.	lady's mantle	DM, SW	X	X		N	
Crataegus monogyna Jacq.		hawthorn	AW		X		E, I	
Cotoneaster franchetii Boiss.		Francheti cotoneaster	CDF	X			E, I	X
Fragaria chiloensis (L.) Duchesne		beach strawberry	DM, CDF	X			N	X
Holodiscus discolor (Pursh.) Maxim.		oceanspray	FS		X		N	X
Malus fusca (Raf.) C. Schneider		Oregon crabapple	RF, CDF	X	X		N	X
Malus sylvestris Miller	*Malus pumila* Mill.	common apple	CDF, FS	X	X		E	X
Oemleria cerasiformis (Hook. &Arn.) J.W. Landon		oso berry	RF		X		N	X
Potentilla anserina L. ssp. *pacifica* (Howell) Rousi	*Argentina anserina* (L.) Rydb.	silverweed	SW, BM, FM		X	X	N	X
Rosa nutkana Presl var. *nutkana*		Nootka rose	CDF	X			N	X
Rubus discolor Weihe & Nees	*Rubus armeniacus* Focke	Himalaya-blackberry	FS, SW, RF, AW,		X		E, I	X
Rubus parviflorus Nutt.		thimbleberry	FS, RF		X		N	X
Rubus spectabilis Pursh		salmonberry	RF, FS		X		N	X
Rubus ursinus Cham. & Schdl.		California blackberry	CDF, RF, FS, DM, DS, SW	X	X		N	X
Spiraea douglasii Hook.		Douglas' spirea	FM, FS, AW		X		N	

Species	Name Changes	Common Name	Habitat (specific)	Habitat (broad)			Status	On Refuge
				UD	PW	EW		
Rubiaceae								
Galium aparine L.		common bedstraw	CDF, RF, BM, FM, AW	X	X		N	X
Galium divaricatum Lam.		Lamarck's bedstraw	FM		X		E	X
Galium trifidum L. var. *pacificum* Wieg.	*Galium trifidum* L. ssp. *columbianum* (Rydb.) Hultén	three-petaled bedstraw	BM		X	X	N	X
Salicaceae								
Populus balsamifera L. ssp. *trichocarpa* (Torry & A. Gray) Brayshaw		black cottonwood	FS, RF		X		N	
Salix alba L.		white willow	FS		X		E, I	
Salix hookeriana Hook.		coastal willow	SW, FS, DS	X	X		N	X
Salix lucida Muhlenb. ssp. *lasiandra* (Benth.) E. Murray		yellow willow	FS, RF		X		N	X
Salix sitchensis Bong.		Coulter Willow	FS		X		N	
Saxifragaceae								
Tellima grandiflora (Pursh) Lindley		fringe cups	RF		X		N	X
Tolmiea menziesii (Pursh) Torrey & A. Gray		pig-a-back plant	RF		X		N	
Scrophulariaceae								
Bellardia trixago (L.) All.		Mediterranean lineseed	FM, DM	X	X		E, I	
Castilleja ambigua Hook & Arn. ssp. *humboldtiensis* (Keck) Chuang & Heckard		Humboldt Bay owl's-clover	SM		X	X	N, C	X
Castilleja attenuata (A. Gray) Chuang & Heckard		narrow-leaved owl's clover	DM	X			N	X
Castilleja exserta (A.A. Heller) Chuang & Heckard ssp. *latifolia* (S. Watson)		purple owl's clover	DM	X			N	X

Species	Name Changes	Common Name	Habitat (specific)	Habitat (broad)			Status	On Refuge
				UD	PW	EW		
Cordylanthus maritimus Benth. ssp. *palustris* (Behr) Chuang & Heckard		Point Reyes bird's-beak	SM			X	N, C	X
Digitalis purpurea L.		fox glove	FM, DS		X		E, I	
Linaria canadensis (L.) Dum.-Cours.	*Nuttallanthus canadensis* (L.) D.A. Sutton	blue toad-flax	DM	X			E	X
Mimulus guttatus DC.		common monkeyflower	FM, AW, RF		X		N	X
Parentucellia viscosa (L.) Caruel		yellow glandweed	SW, FM, AW		X		E, I	X
Scrophularia californica Cham. & Schldl.		California figwort	DS, SW, CDF	X	X		N	X
Triphysaria eriantha (Benth.) Chuang & Heckard ssp. *eriantha*		butter 'n' eggs	DM	X			N	
Triphysaria versicolor Fischer & C. Meyer ssp. *versicolor*		yellow owl's clover	AW		X		N	
Triphysaria pusilla (Benth.) Chuang & Heckard		little owl's clover	DS, DM, CDF	X			N	
Veronica americana (Raf.) Schwein.		American speedwell	FM		X		N	
Veronica persica Poiret		bird's-eye speedwell	AW		X		E	X
Solanaceae								
Solanum americanum Miller		white nightshade	FM, CDF	X	X		N	X
Solanum aviculare Forst. F.		New Zealand nightshade	CDF	X			E, I	X
Solanum douglasii Dunal		greenspot nightshade	FS		X		N	
Solanum nigrum L.		black nightshade	CDF, AW, FM	X	X		E, I	X
Taxodiaceae								
Sequoia sempervirens (D. Don) Endl.		coastal redwood	AW, RF		X		N	
Typhaceae								
Sparganium eurycarpum Engelm. ssp. *eurycarpum*	*Sparganium eurycarpum* Engelm.	bur-reed	BM		X	X	N	X
Typha latifolia L.		cattail	SW, BM, FM		X	X	N	X

Species	Name Changes	Common Name	Habitat (specific)	Habitat (broad)			Status	On Refuge
				UD	PW	EW		
Urticaceae								
Urtica dioica L. ssp. *gracilis* (Aiton) *Selander*		stinging nettle	RF, AW, FM		X		N	
Valerianaceae								
Plectritis congesta (Lindley) A. DC.		sea blush	DM, SW, DS	X	X		N	X
Plectritis brachystemon Fischer & C. Meyer	*Plectritis congesta* (Lindl.) DC. ssp. *brachystemon* (Fisch. & C.A. Mey.) Morey	short-spur sea blush	AW		X		N	
Zosteraceae								
Zostera japonica Aschers. & Graebn.	*Nanozostera japonica* (Asch. & Graebn.) P. Toml. & U. Posl.	dwarf eelgrass	MF			X	E, I	
Zostera marina L.		eelgrass	MF			X	N	X

Status: Conservation concern (C); Exotic (E); Invasive (I); California Native (N); Broad Habitat: Upland dune (UD), Palustrine wetland (PW), Estuarine wetland (EW). Specific Habitat: Dune mat (DM), Dune scrub (DS), Dune swale (SW), Coniferous dune forest (CDF), Riparian forest (RF), Freshwater swamp (FS), Freshwater marsh (FM), Open water (OW), Brackish marsh (BM), Salt marsh (SM), Mudflat (MF) Agricultural wetland (AW).

Revised from G. Leppig, and A. Pickart 2005. Vascular plants of Humboldt Bay Dunes and Wetlands Release 1.2. Unpublished document, U.S. Fish and Wildlife Service, Arcata, California. This vascular plant list for Humboldt Bay dunes and wetlands is still in progress. It is based on collections made by the authors primarily between 2001 and 2008. Please email comments to andrea_pickart@fws.gov or gleppig@dfg.ca.gov. Nomenclature follows the Jepson Manual, Higher Plants of California (U.C. Press 1993).

Castle Rock NWR Flora

Species	Common name	CRNWR Habitat (see codes)	Status
Asteraceae			
Achillea borealis ssp. *arenicola* (syn. *Achillea millefolium* spp. *Arenicola)*	common yarrow	M	N
Chamomilla suaveolens (syn. *Matricaria matricarioides)*	pineapple weed	D	E
Cotula coronopifolia	brass buttons	D	E
Cirsium vulgare	bull thistle	D	E, I
Erigeron glaucus	seaside daisy	NCS	N
Lasthenia maritima (syn. *Lasthenia minor* ssp. *maritima*)	maritime goldfields	NCS	N
Sonchus oleraceus	sow thistle	D	E
Apiaceae			
Angelica hendersonii	coast angelica	NCS, CS	N
Daucus carota	Queen Anne's lace	D	E
Brassicaceae			
Cochlearia officinalis var. *arctica*	Arctic spoonwort	N	C
Coronopus didymus	lesser swine cress	D	E
Raphanus sativus	wild radish	D	E
Caryophyllaceae			
Spergularia macrotheca	sand spurrey	CS, NCS	N
Stellaria media	chickweed	D	E
Chenopodiaceae			
Chenopodium album	lamb's quarters	D	E
Crassulaceae			
Dudleya farinosa	bluff lettuce	CS, CSS	N
Cyperaceae			
Carex obnupta	slough sedge	CS	N
Fabaceae			
Trifolium wormskioldii	coast clover	V	N
Juncaceae			
Juncus lesueurii	salt rush	CS	N
Lamiaceae			
Stachys chamissonis	coast hedge nettle	NCS	N
Plantaginaceae			
Plantago lanceolata	narrow leaved plantain	D	E
Poaceae			
Bromus sp.	brome	many	N
Calamagrostis nutkaensis	Pacific reedgrass	FW	N

Species	Common name	CRNWR Habitat (see codes)	Status
Distichlis spicata	salt grass	G	N
Poa annua	annual blue grass	D	E
Polygonaceae			
Rumex acetosella	common sheep sorrel	D	E, I
Rumex crispus	curly leaved dock	D	E
Polypodiaceae			
Polypodium scouleri	leather fern	CP, CS	N
Portulacaceae			
Calandrinia ciliata	red maids	G	N
Claytonia perfoliata	miner's lettuce	CSS	N
Scrophulariaceae			
Synthyris reniformis	snow queen	F	N

Status: Conservation concern (C); Exotic (E); Invasive (I); California Native (N); Presumed extirpated (PX). Habitat: Meadows (M), Disturbed areas (D), Northern Coastal Scrub (NCS), Coastal Sage Scrub (CSS), Coastal Strand (CS), Coastal Salt Marsh (CSM), Coastal Prairie (CP), Various communities (V), Freshwater wetland (FW), Grassland (G), Forest (F)

Compiled from John O. Sawyer's list of "The Plants Recognized or Collected from Castle Rock, Del Norte, Co. CA." Prepared October 16, 1984, Humboldt State University, Osborne (1972), and from collections by refuge staff in 2005.

Appendix K: Wildlife Lists

Wildlife Lists

Reptiles and Amphibians

Common Name	Scientific Name	Habitat
Class AMPHIBIA (*amphibians*)		
Order ANURA (*frogs and toads*)		
Family BUFONIDAE (*true toads*)		
western toad	*Bufo boreas*	d,ds
Family HYLIDAE (*tree frogs and relatives*)		
Pacific treefrog	*Pseudacris regilla*	r,fm
Family RANIDAE (*true frogs*)		
bullfrog	*Rana catesbeiana*	o,fm,r
red-legged frog	*Rana aurora*	o,fm,r,ds
Order CAUDATA (*salamanders*)		
Family AMBYSTOMATIDAE (*mole salamanders*)		
northwestern salamander	*Ambystoma gracile*	r,g
Family DICAMPTODONTIDAE (*Pacific giant salamanders*)		
California giant salamander	*Dicamptodon ensatus*	c
Family PLETHODONTIDAE (*lungless salamanders*)		
ensatinas	*Ensatina* sp.	c
Family SALAMANDRIDAE (*newts and salamanders*)		
rough-skinned newt	*Taricha granulosa*	ds
Class REPTILIA (*reptiles*)		
Order SQUAMATA (*lizards and snakes*)		
Family ANGUIDAE (*alligator lizards and relatives*)		
northern alligator lizard	*Elgaria coerulea*	r,d
Family BOIDAE (*boas and pythons*)		
coastal rubber boa	*Charina bottae*	g,r,c
Family COLUBRIDAE (*Colubrids*)		
western yellowbelly racer	*Coluber constrictor mormon*	r,g
California kingsnake	*Lampropeltis getula californiae*	wide
gopher snake	*Pituophis catenifer*	s,g
western aquatic garter snake	*Thamnophis couchii*	r
western terrestrial gartersnake (coast gartersnake)	*Thamnophis elegans (Thamnophis elegans terrestris)*	r,c,d
northwestern gartersnake	*Thamnophis ordinoides*	g,a

Common Name	Scientific Name	Habitat
California red-sided gartersnake	*Thamnophis sirtalis infernalis*	f,g,s,fm,d
common garter snake	*Thamnophis sirtalis*	s,fm
Family VIPERIDAE (*vipers*)		
northern Pacific (western) rattlesnake	*Crotalus oreganus oreganus*	c,g
Family SCINCIDAE (*skinks*)		
western skink	*Eumeces skiltonianus*	g,c,r
Family PHRYNOSOMATIDAE (*North American spiny lizards*)		
western fence lizard	*Sceloporus occidentalis*	s,g
Order TESTUDINES (*turtles*)		
Family EMYDIDAE (*box and water turtles*)		
northern Pacific pond turtle	*Actinemys marmorata marmorata (syn. Clemmys marmorata marmorata)*	ds

Habitats: b-beaches; bm - brackish marshes; c - coniferous forest; d - dunes; ds - dune swales; e- Eelgrass beds, Bay shores; fm - freshwater marshes; g - Agricultural grasslands; r - Riparian forests; sm - saltwater marshes; rb-Rocky beaches; m - mudflats ; o - Open water, lakes, creeks, ponds; om - open water marine; s - seasonal wetlands, mudflats, flooded fields; wide - Widespread, found in a variety of habitats

Mammals

Common Name	Scientific Name	Habitat
Order ARTIODACTYLA (*even-toed hoofed animals*) **Family CERVIDAE** (*deer, moose, reindeer, elk*)		
black-tailed deer	*Odocoileus hemionus*	r,s,g
Order CARNIVORA (*meat-eaters*) **Family CANIDAE** (*coyotes, dogs, foxes, jackals and wolves*)		
coyote	*Canis latrans*	wide
gray fox	*Urocyon cinereoargenteus*	g,r
Family ERETHIZONTIDAE (*New World porcupines*)		
North American porcupine	*Erethizon dorsatum*	wide
Family FELIDAE (*cats*)		
feral house cat	*Felis catus*	r,g,c
bobcat	*Lynx rufus*	r,g,d
mountain lion (cougar)	*Puma concolor*	r,c
Family MEPHITIDAE (*skunks and stink badgers*)		
striped skunk	*Mephitis mephitis*	wide
western spotted skunk	*Spilogale gracilis*	rb,r,d
Family MUSTELIDAE (*badgers, otters, weasels and relatives*)		
river otter	*Lontra canadensis*	o,r
long-tailed weasel	*Mustela frenata*	r,g,d
American mink	*Mustela vison*	r
Family OTARIIDAE (*fur seals and sea lions*)		
California sea lion	*Zalophus californianus*	om,rb
Family PHOCIDAE (*seals*)		
harbor seal	*Phoca vitulina*	b,rb,om
Family PROCYONIDAE (*coatis, raccoons, lesser pandas*)		
ringtail	*Bassariscus astutus*	c,r
raccoon	*Procyon lotor*	wide
Family URSIDAE (*bears*)		
American black bear	*Ursus americanus*	r,c
Order CETACEA (*dolphins, porpoises, and whales*) **Family PHOCOENIDAE** (*porpoises*)		
harbor porpoise	*Phocoena phocoena*	om
Order CHIROPTERA (*bats*) **Family MOLOSSIDAE** (*free-tailed bats*)		
lump-nosed bat (Rafinesque's big-eared bat)	*Corynorhinus rafinesquei*	c
big brown bat	*Eptesicus fuscus*	c
California myotis	*Myotis californicus*	c
long-eared bat (western long-eared myotis)	*Myotis evotis*	c
fringed bat (fringed myotis)	*Myotis thysanodes*	unknown

Common Name	Scientific Name	Habitat
hairy-winged myotis (long-legged myotis)	*Myotis volans*	r,c
Yuma myotis	*Myotis yumanensis*	c
Order DIDELPHIMORPHIA (*American marsupials*) **Family DIDELPHIDAE** (*opossums*)		
Virginia opossum	*Didelphis virgiana*	r
Order INSECTIVORA (*insect-eaters*)		
Family Soricidae (shrews)		
marsh shrew	*Sorex bendirii*	fm,s
Pacific shrew	*Sorex pacificus*	r,g
Trowbridge's shrew	*Sorex trowbridgii*	r,g
vagrant shrew	*Sorex vagrans*	c
Family TALPIDAE (*desmans, moles, and relatives*)		
American shrew mole	*Neurotrichus gibbsii*	c
coast mole	*Scapanus orarius*	g
Townsend's mole	*Scapanus townsendii*	g,r,c
Order LAGOMORPHA (*pikas, hares and rabbits*) **Family LEPORIDAE** (*hares and rabbits*)		
black-tailed jackrabbit	*Lepus californicus*	s,g,d,c
brush rabbit	*Sylvilagus bachmani*	c
Order RODENTIA (*gnawing mammals*) **Family CRICETIDAE** (*New World rats and mice, voles, hamsters and relatives*)		
white footed vole	*Arborimus albipes*	c
California vole (California meadow mouse)	*Microtus californicus*	g,r
long-tailed vole (long-tailed meadow mouse)	*Microtus longicaudus*	g,r
creeping vole (Oregon meadow mouse)	*Microtus oregoni*	r
dusky-footed woodrat	*Neotoma fuscipes*	r
deer mouse	*Peromyscus maniculatus*	c,r,g
western harvest mouse	*Reithrodontomys megalotis*	fm,s,g,c
Family GEOMYIDAE (*gophers*)		
Botta's pocket gopher	*Thomomys bottae*	g
Family MURIDAE (*Old World mice, rats*)		
house mouse	*Mus musculus*	s,g,r
black rat	*Rattus rattus*	s,g,r
Family SCIURIDAE (*chipmunks, squirrels, marmots*)		
northern flying squirrel	*Glaucomys sabrinus*	c,r
California (Beechey) ground squirrel	*Spermophilus beecheyi*	r,g

Habitats: a - Aerial, usually observed in flight; b-beaches; bm - brackish marshes; c - coniferous forest; d - dunes; ds - dune swales; e- Eelgrass beds, Bay shores; fm - freshwater marshes; g - Agricultural grasslands; r - Riparian forests; sm - saltwater marshes; rb-Rocky beaches; m - mudflats ; o - Open water, lakes, creeks, ponds; om - open water marine; s - seasonal wetlands, mudflats, flooded fields; wide - Widespread, found in a variety of habitats

Birds

Common Name	Scientific Name	Primary Habitat	Sp	S	F	W	Breeding Range?	Habitat Source
Order ANSERIFORMES (*waterfowl*)								
Family ANATIDAE (*ducks, geese and swans*)								
*wood duck	*Aix sponsa*	o,r	o	o	o	o	yes	BONA
northern pintail	*Anas acuta*	g,s,fm,bm,m	c	r	c	c	no	BONA
American wigeon	*Anas americana*	fm,r,s,bm	c	r	c	c	no	BONA
*northern shoveler	*Anas clypeata*	fm,bm,sm,s	c	r	c	c	no	BONA
green-winged teal	*Anas crecca*	o,fm	c	o	c	c	no	BONA
*cinnamon teal	*Anas cyanoptera*	s,fm	u	c	u	u	yes	BONA
blue-winged teal	*Anas discors*	s,fm,bm	u	o	o	r	no	BONA
eurasian wigeon	*Anas penelope*	s	r		o	o	yes	BONA
*mallard	*Anas platyrhynchos*	fm,s,g,o	c	c	c	c	yes	BONA
*gadwall	*Anas strepera*	o,fm,bm	u	o	u	u	no	BONA
greater white-fronted goose	*Anser albifrons*	g,s	o		o	o	no	BONA
lesser scaup	*Aythya affinis*	o,s	c	o	c	c	no	BONA
redhead	*Aythya americana*	sm,bm	o	r	o	u	no	BONA
ring-necked duck	*Aythya collaris*	o,s	o		o	o	no	BONA
tufted duck	*Aythya fuligula*	o,s,om,fm,sm,bm	r		r	r		BONA
greater scaup	*Aythya marila*	om,sm,bm	c	o	c	c	no	BONA
canvasback	*Aythya valisineria*	o,s	r	r	u	u	yes	BONA
bufflehead	*Bucephala albeola*	om,o,s	c	r	c	c	no	BONA
common goldeneye	*Bucephala clangula*	om,o,s	o		o	u	no	BONA
barrow's goldeneye	*Bucephala islandica*	om,o,s				r	no	BONA
Pacific brant	*Branta bernicla*	e,sm	a	u	u	c	no	BONA
Pacific brant	*Branta bernicla nigricans*	e,sm	a	u	u	c	no	BONA
*Moffit (Great Basin) Canada goose	*Branta canadensis*	o,s,g	a	a	a	a	no	BONA
Aleutian cackling goose	*Branta canadensis leucopareia*	g,o,s	c		c	c	no	BONA
cackling goose	*Branta canadensis minima*	om	c		u	c	no	BONA
snow goose	*Chen caerulescens*	o,s,g	o		o	r	no	BONA

Common Name	Scientific Name	Primary Habitat	Sp	S	F	W	Breeding Range?	Habitat Source
emperor goose	*Chen canagica*	om				r	no	check w staff to confirm may be out of range
Ross' goose	*Chen rossii*	o,s,g	o		r	r	no	BONA
long-tailed duck (oldsquaw)	*Clangula hyemalis*	om,o	r	r	o	o	no	BONA
tundra swan	*Cygnus columbianus*	o,s	o		o	c	no	BONA
harlequin duck	*Histrionicus histrionicus*	e,b	r		r	o	no	BONA
hooded merganser	*Lophodytes cucullatus*	o,s	o		o	o	no	BONA
white-winged scoter	*Melanitta fusca*	om	c	r	c	c	no	BONA
black scoter	*Melanitta nigra*	b	o		o	u	no	BONA
surf scoter	*Melanitta perspicillata*	b,m	c	r	c	a	no	BONA
common merganser	*Mergus merganser*	o,s	u	u	u	u	yes	BONA
red-breasted merganser	*Mergus serrator*	om,sm	c		c	c	no	BONA
*ruddy duck	*Oxyura jamaicensis*	fm,o	c	u	c	c	yes	BONA
Order APODIFORMES (*swifts and hummingbirds*)								
Family APODIDAE (*swifts*)								
Vaux's swift	*Chaetura vauxi*	r,c	c	c	c	r	yes	
black swift	*Cypseloides niger*	g	o		r		no	
Family TROCHILIDAE (*hummingbirds*)								
*Anna's hummingbird	*Calypte anna*	c,r	c	c	c	c	yes	
Costa's hummingbird	*Calypte costae*	c	r	r	r		no	
rufous hummingbird	*Selasphorus rufus*							
	c,r	c	r			yes		
*Allen's hummingbird	*Selasphorus sasin*	c,r	c	c	c		yes	
calliope hummingbird	*Stellula calliope*	c,r	r	r			yes	
Order CAPRIMULGIFORMES (*nightbirds*)								
Famiy CAPRIMULGIDAE (*nightjars*)								
*common nighthawk	*Chordeiles minor*	d,g	u	u			yes	BONA
common poorwill	*Phalaenoptilus nuttallii*	g	r		r		yes	BONA
Order CHARADRIIFORMES (*shorebirds*)								
Famiy ALCIDAE (*puffins, murres, auklets, and relatives*)								
marbled murrelet	*Brachyramphus marmoratus*	cf,rb	o	u	u	r	yes	BONA
pigeon guillemot	*Cepphus columba*	rb,om	u	u	u	r	yes	BONA

Common Name	Scientific Name	Primary Habitat	Sp	S	F	W	Breeding Range?	Habitat Source
rhinoceros auklet	*Cerorhinca monocerata*	om	o	o	o	o	no	BONA
tufted puffin	*Fratercula cirrhata*	rb,om		r		r	no	BONA
horned puffin	*Fratercula corniculata*	om	r	r		r	no	BONA
Cassin's auklet	*Ptychoramphus aleuticus*	rb,om	o	o	o	o	yes	BONA
ancient murrelet	*Synthliboramphus antiquus*	om				r	no	BONA
common murre	*Uria aalge*	rb,om	o	c	c	o	yes	BONA
Family CHARADRIIDAE (*plovers and lapwings*)								
*snowy plover	*Charadrius alexandrinus*	b	u	o	u	u	yes	BONA
mountain plover	*Charadrius montanus*	g			r	r	no	BONA
semipalmated plover	*Charadrius semipalmatus*	b,m,g,sm	c	o	c	c	no	BONA
*killdeer	*Charadrius vociferus*	m,g,s,	c	c	c	c	yes	BONA
Pacific golden-plover (syn. lesser golden-plover)	*Pluvialis fulva*	s,g,b	o		u	o	no	BONA
black-bellied plover	*Pluvialis squatarola*	s,g,b	c	u	c	c	no	BONA
Family HAEMATOPODIDAE (*oystercatchers*)								
*black oystercatcher	*Haematopus bachmani*	rb,e	r	r	r	r	yes	BONA
Family LARIDAE (*gulls and terns*)								
black tern	*Chlidonias niger*	o,s,a	r		r		no	BONA
herring gull	*Larus argentatus*	rb,m	u		u	u	no	
California gull	*Larus californicus*	wide	c	c	c	c	no	
mew gull	*Larus canus*	wide	c	r	c	c	no	
ring-billed gull	*Larus delawarensis*	fm,g,s	c	c	c	c	no	
glaucous-winged gull	*Larus glaucescens*	om,sm,br,m	c	u	c	c	no	
Thayer's gull	*Larus glaucoides*	om,rb	o		o	o	no	
Heermann's gull	*Larus heermanni*	om,rb	r	c	c	r	no	
glaucous gull	*Larus hyperboreus*	wide				o	no	
Bonaparte's gull	*Larus philadelphia*	wide	c	o	c	o	no	
Franklin's gull	*Larus pipixcan*	wide	r		o	r	no	
western gull	*Larus occidentalis*	rb,m	c	c	c	c	yes	
black-legged kittiwake	*Rissa tridactyla*	om	u		u	u	no	

Common Name	Scientific Name	Primary Habitat	Sp	S	F	W	Breeding Range?	Habitat Source
long-tailed jaeger	*Stercorarius longicaudus*	om			o		no	BONA
parasitic jaeger	*Stercorarius parasiticus*	om	r	r	c	r	no	BONA
Pomarine jaeger	*Stercorarius pomarinus*	om	o	r	c	r	no	BONA
*Caspian tern	*Sterna caspia*	wide	c	u	c	c	yes	
elegant tern	*Sterna elegans*	e		u	u		no	
Forster's tern	*Sterna forsteri*	fm,bm,sm	u	r	c	u	no	
common tern	*Sterna hirundo*	om,e	c	r	c		no	
black tern	*Chlidonias niger*	fm,s,o,r	r		r		no	
Arctic tern	*Sterna paradisaea*	om,b			o		no	
Sabine's gull	*Xema sabini*	om	r		r		no	
Family RECURVIROSTRIDAE (*avocets and stilts*)								
*black-necked stilt	*Himantopus mexicanus*	s,sm,g	r	r	r	r	no	BONA
*American avocet	*Recurvirostra americana*	s,sm,g	c	r	c	c	no	BONA
Family SCOLOPACIDAE (*sandpipers and phalaropes*)								
*spotted sandpiper	*Actitis macularius*	o,b	u	u	u	u	yes	BONA
surfbird	*Aphriza virgata*	rb,b,m	c		c	c	no	BONA
ruddy turnstone	*Arenaria interpres*	rb,m,e	u	r	u	u	no	BONA
black turnstone	*Arenaria melanocephala*	g,m,rb,sm	c	r	c	c	no	BONA
sanderling	*Calidris alba*	m,rb,s	c		c	c	no	BONA
sharp-tailed sandpiper	*Calidris acuminata*	g,m			r		no	various
dunlin	*Calidris alpina*	e,s,g,m	a	r	a	a	no	BONA
Baird's sandpiper	*Calidris bairdii*	fm,s,b	r		u		no	BONA
red knot	*Calidris canutus*	e	u		u	r	no	BONA
stilt sandpiper	*Calidris himantopus*	br,sm,fm,m,s			0		no	BONA
western sandpiper	*Calidris mauri*	m,s	a	o	a	c	no	BONA
pectoral sandpiper	*Calidris melanotos*	s,g,sm	r		u		no	BONA
least sandpiper	*Calidris minutilla*	m,s,g,sm	c	o	c	c	no	BONA
rock sandpiper	*Calidris ptilocnemis*	b,rb	r		r	o	no	BONA
semipalmated sandpiper	*Calidris pusilla*	fm,sm,m,g			o		no	BONA
willet	*Catoptrophorus semipalmatus*	g,sm,b,rb	c	u	c	c	no	BONA
Wilson's snipe	*Gallinago delicata*	g,s,fm					no	BONA

Common Name	Scientific Name	Primary Habitat	Sp	S	F	W	Breeding Range?	Habitat Source
common snipe	*Gallinago gallinago*	m	c	r	c	c	no	various
wandering tattler	*Heteroscelus incanus*	rb,o	u	o	u	o	no	BONA
short-billed dowitcher	*Limnodromus griseus*	sm,m,s,g	c	r	c	u	no	BONA
long-billed dowitcher	*Limnodromus scolopaceus*	fm,m,s,b	c		c	c	no	BONA
marbled godwit	*Limosa fedoa*	g,s	a	o	a	a	no	BONA
whimbrel	*Numenius phaeopus*	rb,sm,b,g,m	c	o	c	u	no	BONA
long-billed curlew	*Numenius americanus*	g,sm,m	u	o	u	u	no	BONA
red phalarope	*Phalaropus fulicarius*	om	o		o		no	BONA
red-necked phalarope	*Phalaropus lobatus*	om,sm,bm,fm,o	c	r	c		no	BONA
Wilson's phalarope	*Phalaropus tricolor*	m,om	o	r	o		no	BONA
ruff	*Philomachus pugnax*	g,s			r		no	BONA
lesser yellowlegs	*Tringa flavipes*	o,s,sm,fm,g,m	o	o	c	o	no	BONA
greater yellowlegs	*Tringa melanoleuca*	s,g,sm,m	c	o	c	c	no	BONA
solitary sandpiper	*Tringa solitaria*	m,o,r	o		o		no	BONA
buff-breasted sandpiper	*Tryngites subruficollis*	g			r		no	BONA
Order CICONIIFORMES (*storks, herons and relatives*)								
Family ARDEIDAE (*bitterns, herons and egrets*)								
*great egret	*Ardea alba*	fm,s,r	c	c	c	c	yes	BONA
*great blue heron	*Ardea herodias*	fm,s,r	c	c	c	c	yes	BONA
*American bittern	*Botaurus lentiginosus*	fm,bm,s	o	o	o	o	yes	BONA
*cattle egret	*Bubulcus ibis*		c	r	c	c	yes	BONA
*green heron	*Butorides virescens*	fm,r	u	u	u	o	yes	BONA
*snowy egret	*Egretta thula*	fm,s,r	c	c	c	c	yes	BONA
*black-crowned night-heron	*Nycticorax nycticorax*	fm,s,r	c	c	c	c	yes	BONA
Family CATHARTIDAE (*vultures*)								
turkey vulture	*Cathartes aura*	a	c	c	c	u	yes	BONA
Family THRESKIORNITHIDAE (*ibises*)								
white-faced ibis	*Eudocimus albus*	sg					no	BONA

Common Name	Scientific Name	Primary Habitat	Sp	S	F	W	Breeding Range?	Habitat Source
Order COLUMBIFORMES (*pigeons*)								
Family COLUMBIDAE (*doves and pigeons*)								
*rock pigeon	*Columba livia*	rb,g	u	u	u	u	yes	BONA
*band-tailed pigeon	*Patagioenas fasciata*	c,r	c	c	c	o	yes	BONA
white-winged dove	*Zenaida asiatica*	r,g			r		no	BONA
*mourning dove	*Zenaida macroura*	g,c,r	c	c	c	u	yes	BONA
Order CORACIIFORMES (*kingfishers and relatives*)								
Family ALCEDINIDAE (*kingfishers*)								
*belted kingfisher	*Ceryle alcyon*	o,r	c	c	c	c	yes	BONA
Order FALCONIFORMES (*diurnal birds of prey*)								
Family ACCIPITRIDAE (*osprey, kites, eagles and hawks*)								
*Cooper's hawk	*Accipiter cooperii*	r,c	u	u	u	u	yes	BONA
sharp-shinned hawk	*Accipiter striatus*	c,r	c	u	c	c	yes	BONA
*red-tailed hawk	*Buteo jamaicensis*	wide	c	c	c	c	yes	BONA
*red-shouldered hawk	*Buteo lineatus*	r,c	c	c	c	c	yes	BONA
rough-legged hawk	*Buteo lagopus*	g,d			u	c	no	BONA
ferruginous hawk	*Buteo regalis*	r,c	r		r	o	no	BONA
Swainson's hawk	*Buteo swainsoni*	r,s,g,d					no	BONA
*northern harrier	*Circus cyaneus*	fm,s,g	c	u	c	c	yes	BONA
*white-tailed kite	*Elanus leucurus*	wide					yes	BONA
*bald eagle	*Haliaeetus leucocephalus*	a	o	o	o	u	no (islands off coast)	BONA
*osprey	*Pandion haliaetus*	wide	c	c	c	u	yes	BONA
Family FALCONIDAE (*falcons*)								
merlin	*Falco columbarius*	g,c,r	u		u	u	no	BONA
prairie falcon	*Falco mexicanus*	g			o	o	no	BONA
peregrine falcon	*Falco peregrinus*	wide	u	o	u	u	yes	BONA
*American kestrel	*Falco sparverius*	g,c,r	c	c	c	c	yes	BONA
Order GALLIFORMES (*megapodes, curassows, pheasants, quails and relatives*)								
Family ODONTOPHORIDAE								
*California quail	*Callipepla californica*	g,c	c	c	c	c	yes	BONA
Order GAVIIFORMES (*loons and divers*)								
Family GAVIIDAE (*loons or divers*)								
yellow-billed loon	*Gavia adamsii*	om				r	no	BONA
common loon	*Gavia immer*	om	c	u	u	c	no	BONA
Pacific loon	*Gavia pacifica*	om	c	r	c	u	no	BONA
red-throated loon	*Gavia stellata*	om	c	o	c	c	no	BONA

Common Name	Scientific Name	Primary Habitat	Sp	S	F	W	Breeding Range?	Habitat Source
Order GRUIFORMES (*coots, cranes and rails*)								
Family GRUIDAE (*cranes*)								
sandhill crane	*Grus canadensis*	s,g,m	r		r	r	no	BONA
Family RALLIDAE								
*American coot	*Fulica americana*	fm,o,s,bm,sm	c	u	c	c	yes	BONA
common moorhen	*Gallinula chloropus*	fm,o	r		r	r	no	BONA
sora	*Porzana carolina*	fm,bm,sm,s,g	u	o	u	u	no	BONA
*Virginia rail	*Rallus limicola*	fm,s,g	c	c	c	c	yes	BONA
Order PASSERIFORMES (*perching birds*)								
Family AEGITHALIDAE (*bushtits*)								
*bushtit	*Psaltriparus minimus*	c,r	u	u	u	u	yes	BONA
Family ALAUDIDAE (*larks*)								
horned lark	*Eremophila alpestris*	g,d	o		o	o	no	BONA
Family BOMBYCILLIDAE (*waxwings*)								
*cedar waxwing	*Bombycilla cedrorum*	c,r,g	c	u	c	r	yes	
Bohemian waxwing	*Bombycilla garrulus*	r,c				r	no	
Family CERTHIIDAE (*creepers*)								
*brown creeper	*Certhia americana*	c,r	u	u	u	u	yes	
Family CINCLIDAE (*dippers*)								
*American dipper	*Cinclus mexicanus*	r	r	r	r	r	yes	BONA
Family CORVIDAE (*jays, magpies and crows*)								
*western scrub-jay	*Aphelocoma californica*	c,r			r		yes	BONA
*American crow	*Corvus brachyrhynchos*	wide	c	c	c	c	yes	BONA
*common raven	*Corvus corax*	wide	c	c	c	c	yes	BONA
*Steller's jay	*Cyanocitta stelleri*	c,r	c	c	c	c	yes	BONA
Family EMBERIZIDAE (*towhees and sparrows*)								
saltmarsh sharp-tailed sparrow	*Ammodramus caudacutus*	g,s,fm	r		r	r	no	BONA
grasshopper sparrow	*Ammodramus savannarum*	g	r	r		r	yes	BONA
lark bunting	*Calamospiza melanocorys*	g,r			r		no	BONA
Lapland longspur	*Calcarius lapponicus*	g	o		o	o	no	BONA
chestnut-collared longspur	*Calcarius ornatus*	g			r	r	no	BONA

Common Name	Scientific Name	Primary Habitat	Sp	S	F	W	Breeding Range?	Habitat Source
lark sparrow	*Chondestes grammacus*	r,g			o	r	yes	BONA
*spotted towhee	*Pipilo maculatus*	c,r	c	c	c	c	yes	BONA
*dark-eyed junco	*Junco hyemalis*	c,g,r	c	c	c	c	yes	BONA
swamp sparrow	*Melospiza georgiana*	wide	o		o	o	no	BONA
Lincoln's sparrow	*Melospiza lincolnii*	c,r	u		c	u	no	BONA
*song sparrow	*Melospiza melodia*	c,r	c	c	c	c	yes	BONA
*savannah sparrow	*Passerculus sandwichensis*	g,r,c,sm	c	c	c	c	yes	BONA
fox sparrow	*Passerella iliaca*	c	u		u	u	no	BONA
California towhee	*Pipilo crissalis*	r	r		r	r	yes	BONA
snow bunting	*Plectrophenax nivalis*	g,sm,d			r	r	no	BONA
vesper sparrow	*Pooecetes gramineus*	g	o	r	o	r	no	BONA
American tree sparrow	*Spizella arborea*	g,s,fm,r,c			r	r	no	BONA
Brewer's sparrow	*Spizella breweri*	c,r	r		r		no	BONA
clay-colored sparrow	*Spizella pallida*	g,r,c			o	r	no	BONA
*chipping sparrow	*Spizella passerina*	g,r,c	u	u	u		yes	BONA
white-throated sparrow	*Zonotrichia albicollis*	r	o		o	o	no	BONA
golden-crowned sparrow	*Zonotrichia atricapilla*	r	u		u	c	no	BONA
*white-crowned sparrow	*Zonotrichia leucophrys*	g,c,r	c	c	c	c	yes	BONA
Harris's sparrow	*Zonotrichia querula*	r,a	r		r	r	no	BONA
Family FRINGILLIDAE (*finches*)								
*lesser goldfinch	*Carduelis psaltria*	r	c	c	c	u	yes	BONA
*American goldfinch	*Carduelis tristis*	g,r	c	c	c	c	no	BONA
*house finch	*Carpodacus mexicanus*	g,r,c					yes	BONA
*pine siskin	*Carduelis pinus*	c,r	c	c	c	c	yes	BONA
*purple finch	*Carpodacus purpureus*	c,r	c	c	c	c	yes	BONA
*evening grosbeak	*Coccothraustes vespertinus*	c	u	u	u	u	yes	BONA
*red crossbill	*Loxia curvirostra*	c	u	u	u	u	yes	BONA
Family HIRUNDINIDAE (*swallows*)								
*barn swallow	*Hirundo rustica*	g,fm	c	c	c	r	yes	BONA

Common Name	Scientific Name	Primary Habitat	Sp	S	F	W	Breeding Range?	Habitat Source
*cliff swallow	*Petrochelidon pyrrhonota*	g,r	c	c	c		yes	BONA
purple martin	*Progne subis*	c,r,fm	o		o		yes	BONA
bank swallow	*Riparia riparia*	a,m	o		o		no	BONA
*northern rough-winged swallow	*Stelgidopteryx serripennis*	c,r	c	c	c		yes	BONA
*tree swallow	*Tachycineta bicolor*	g,s,fm,bm,r	c	c	c	r	yes	BONA
*violet-green swallow	*Tachycineta thalassina*	c,r	c	c	c	r	yes	BONA
Family ICTERIDAE (*icterids*)								
*red-winged blackbird	*Agelaius phoeniceus*	wide	c	c	c	c	yes	BONA
tricolored blackbird	*Agelaius tricolor*	fm,r	r		r	r	yes	BONA
bobolink	*Dolichonyx oryzivorus*	g,fm	r		r		no	BONA
rusty blackbird	*Euphagus carolinus*	g			r		no	BONA
*Brewer's blackbird	*Euphagus cyanocephalus*	wide	c	c	c	c	yes	BONA
*hooded oriole	*Icterus cucullatus*	r	o	o	o		yes	BONA
*Baltimore oriole	*Icterus galbula*	r	c	c	c	r	no	BONA
orchard oriole	*Icterus spurius*	g			r	r	no	BONA
*brown-headed cowbird	*Molothrus ater*	g,r,c	c	c	c	r	yes	BONA
*western meadowlark	*Sturnella neglecta*	g	c	c	c	c	yes	BONA
yellow-headed blackbird	*Xanthocephalus xanthocephalus*	g	o		o	r	no	BONA
Family LANIIDAE (*shrikes*)								
northern shrike	*Lanius excubitor*	wide	o		o	o	no	BONA
loggerhead shrike	*Lanius ludovicianus*	g,r,c	r		r	r	no	BONA
Family MIMIDAE (*mockingbirds and thrashers*)								
northern mockingbird	*Mimus polyglottos*	g,r,c					yes	BONA
sage thrasher	*Oreoscoptes montanus*	g					no	BONA
Family MOTACILLIDAE (*wagtails and pipits*)								
American pipit	*Anthus rubescens*	r,s,m	c		c	c	no	BONA
Family PARIDAE (*titmice*)								
*black-capped chickadee	*Poecile atricapilla*	r,c	u	u	u	u	yes	BONA
mountain chickadee	*Poecile gambeli*	c,r			r	r	no	BONA
*chestnut-backed chickadee	*Poecile rufescens*	c,r	c	c	c	c	yes	BONA

Common Name	Scientific Name	Primary Habitat	Sp	S	F	W	Breeding Range?	Habitat Source
Family PARULIDAE (*warblers*)								
black-throated blue warbler	*Dendroica caerulescens*	r			r		no	BONA
bay-breasted warbler	*Dendroica castanea*	c,r	r		r		no	BONA
*yellow-rumped warbler	*Dendroica coronata*	c,r	c	u	c	c	yes	BONA
yellow-throated warbler	*Dendroica dominica*	c	r				no	BONA
prairie warbler	*Dendroica discolor*	c	r		r	r	no	BONA
blackburnian warbler	*Dendroica fusca*	c,r			r		no	BONA
magnolia warbler	*Dendroica magnolia*	c,g	r		r		no	BONA
black-throated gray warbler	*Dendroica nigrescens*	c,r	c	c	c	r	yes	BONA
*hermit warbler	*Dendroica occidentalis*	c	u	u	u		yes	BONA
palm warbler	*Dendroica palmarum*	r,c	u		u	u	no	BONA
chestnut-sided warbler	*Dendroica pensylvanica*	r	r		o	r	no	BONA
*yellow warbler	*Dendroica petechia*	r	c	c	c	r	yes	BONA
blackpoll warbler	*Dendroica striata*	c,r	r		o		no	BONA
cape may warbler	*Dendroica tigrina*	r,c	r		r		no	BONA
townsend's warbler	*Dendroica townsendi*	c,r	c		c	c	no	BONA
common yellowthroat	*Geothlypis trichas*	r,c	u	u	u	r	yes	BONA
yellow-breasted chat	*Icteria virens*	r,c	o	o	o		yes	BONA
black-and-white warbler	*Mniotilta varia*	r,c	o	r	o	o	no	BONA
Macgillivray's warbler	*Oporornis tolmiei*	c,r	u	u	u		yes	BONA
northern parula	*Parula americana*	c	r		r		no	BONA
prothonotary warbler	*Protonotaria citrea*	fm,r				r	no	BONA
ovenbird	*Seiurus aurocapilla*	r,c	r		r		no	BONA
northern waterthrush	*Seiurus noveboracensis*	r	r		o	r	no	BONA
American redstart	*Setophaga ruticilla*	r,c	r	r	r	r	no	BONA
*orange-crowned warbler	*Vermivora celata*	c,d,r	c	c	c	u	yes	BONA
Tennessee warbler	*Vermivora peregrina*	c,d	o		o	o	no	BONA
Nashville warbler	*Vermivora ruficapilla*	c,r	c	c	c	o	no	BONA

Common Name	Scientific Name	Primary Habitat	Sp	S	F	W	Breeding Range?	Habitat Source
Virginia's warbler	*Vermivora virginiae*	r			r		no	BONA
hooded warbler	*Wilsonia citrina*	c,r		r	r		no	BONA
Wilson's warbler	*Wilsonia pusilla*	r	c	c	c	r	yes	BONA
Family PASSERIDAE (*Old World sparrows*)								
*house sparrow	*Passer domesticus*	g	c	c	c	c	yes	BONA
Family REGULIDAE (*kinglets*)								
ruby-crowned kinglet	*Regulus calendula*	c,r	c		c	c	no	BONA
golden-crowned kinglet	*Regulus satrapa*	r,c	c	c	c	c	yes	BONA
Family SITTIDAE (*nuthatches*)								
red-breasted nuthatch	*Sitta canadensis*	c			o	r	yes	BONA
Family STURNIDAE (*starlings*)								
*European starling	*Sturnus vulgaris*	wide	a	c	a	a	yes	BONA
Family SYLVIIDAE (*gnatchatchers*)								
blue-gray gnatcatcher	*Polioptila caerulea*	r	r	r	r	r	yes	BONA
Family TIMALIIDAE (*babbler*)								
wrentit	*Chamaea fasciata*	r,c	c	c	c	c	yes	BONA
Family TROGLODYTIDAE (*wrens*)								
*marsh wren	*Cistothorus palustris*	fm	c	c	c	c	yes	BONA
*house wren	*Troglodytes aedon*	r,c	c	c	c	r	yes	BONA
*Bewick's wren	*Thryomanes bewickii*	r	c	c	c	c	yes	BONA
*winter wren	*Troglodytes troglodytes*	c,r,fm,s,o	c	c	c	c	yes	BONA
Family TURDIDAE (*thrushes*)								
hermit thrush	*Catharus guttatus*	c,r,g	c		c	c	yes	BONA
Swainson's thrush	*Catharus ustulatus*	r	c	c	c		yes	BONA
varied thrush	*Ixoreus naevius*	c,r,g	c	c	c	c	yes	BONA
Townsend's solitaire	*Myadestes townsendi*	c,g	r			r	no	BONA
mountain bluebird	*Sialia currucoides*	g,r	r		r		no	BONA
western bluebird	*Sialia mexicana*	c,r			o	o	yes	BONA
American robin	*Turdus migratorius*	r,c,g	c	c	c	c	yes	BONA
Family TYRANNIDAE (*flycatchers*)								
*olive-sided flycatcher	*Contopus cooperi*	c,r	c	c	c		yes	BONA
*western wood-pewee	*Contopus sordidulus*	r,c	c	c	c		yes	BONA
*pacific-slope flycatcher	*Empidonax difficilis*	c,r	c	c	c		yes	BONA

Common Name	Scientific Name	Primary Habitat	Sp	S	F	W	Breeding Range?	Habitat Source
least flycatcher	*Empidonax minimus*	r			r		no	BONA
dusky flycatcher	*Empidonax oberholseri*	c,r	r		r		yes	BONA
willow flycatcher	*Empidonax traillii*	r	o	o	o		no	BONA
gray flycatcher	*Empidonax wrightii*	r,c	r				no	BONA
ash-throated flycatcher	*Myiarchus cinerascens*	c,r	o		o	r	yes	BONA
*black phoebe	*Sayornis nigricans*	rb,r,g,o	c	c	c	c	yes	BONA
Say's phoebe	*Sayornis saya*	g	r		r	r	no	BONA
tropical kingbird	*Tyrannus melancholicus*	g			o	r	no	BONA
eastern kingbird	*Tyrannus tyrannus*	wide	r	r	r		no	BONA
western kingbird	*Tyrannus verticalis*	wide	u		u		yes	BONA
Family VIREONIDAE (*vireos*)								
*warbling vireo	*Vireo gilvus*	wide	c	c	c		yes	BONA
*Hutton's vireo	*Vireo huttoni*	c,r	c	c	c	c	yes	BONA
red-eyed vireo	*Vireo olivaceus*	r,c	r		r		no	BONA
*blue-headed vireo	*Vireo solitarius*	c,r	u	u	u	r	yes	BONA
Order PELECANIFORMES (*pelicans, tropicbirds, cormorants and relatives*)								
Family FREGATIDAE (*frigatebirds*)								
magnificent frigatebird	*Fregata magnificens*	om		r	r		no	BONA
Family PELECANIDAE (*pelicans*)								
American white pelican	*Pelecanus erythrorhynchos*	o,r	r		r		no	BONA
California brown pelican	*Pelecanus occidentalis californicus*	om	o	c	c	o	no	BONA
Family PHALACROCORACIDAE (*cormorants*)								
*double-crested cormorant	*Phalacrocorax auritus*	om,o	c	c	c	c	yes	BONA
pelagic cormorant	*Phalacrocorax pelagicus*	om	c	c	c	c	yes	BONA
Brandt's cormorant	*Phalacrocorax penicillatus*	om	c	c	c	r	yes	BONA
Order PICIFORMES (*woodpeckers and relatives*)								
Family PICIDAE (*woodpeckers*)								
*northern flicker	*Colaptes auratus*	r	o	o	o	o	yes	BONA

Common Name	Scientific Name	Primary Habitat	Sp	S	F	W	Breeding Range?	Habitat Source
*pileated woodpecker	*Dryocopus pileatus*	r,c	o	o	o	o	yes	BONA
acorn woodpecker	*Melanerpes formicivorus*	r,c	r		r		yes	BONA
Lewis's woodpecker	*Melanerpes lewis*	r			r		no	BONA
*downy woodpecker	*Picoides pubescens*	r,c	c	c	c	c	yes	BONA
*hairy woodpecker	*Picoides villosus*	r,c	c	c	c	c	yes	BONA
red-naped sapsucker	*Sphyrapicus nuchalis*	c	r		r	r	yes	BONA
*red-breasted sapsucker	*Sphyrapicus ruber*	c,r	u	u	u	u	yes	BONA
yellow-bellied sapsucker	*Sphyrapicus varius*	c,r	r		r	r	no	BONA
Order PODICIPEDIFORMES (*grebes*)								
Family PODICIPEDIDAE (*grebes*)								
Clark's grebe	*Aechmophorus clarkii*	om	o		o	o	yes	BONA
*western grebe	*Aechmophorus occidentalis*	om	c	u	c	c	yes	BONA
horned grebe	*Podiceps auritus*	o,om	c	r	c	c	no	BONA
red-necked grebe	*Podiceps grisegena*	om,o	u	r	u	u	no	BONA
eared grebe	*Podiceps nigricollis*	o,om	c		c	c	no	BONA
*pied-billed grebe	*Podilymbus podiceps*	o,om	u	u	u	u	yes	BONA
Order PROCELLARIIFORMES (*tube-nosed seabirds*)								
Family PROCELLARIIDAE (*petrels and shearwaters*)								
northern fulmar	*Fulmarus glacialis*	om	r		o	r	no	BONA
pink-footed shearwater	*Puffinus creatopus*	om	r	r	o	r	no	BONA
sooty shearwater	*Puffinus griseus*	om	o	o	r	r	no	BONA
short-tailed shearwater	*Puffinus tenuirostris*	om			r	r	no	BONA
Order STRIGIFORMES (*owls*)								
Family TYTONIDAE (*typical owls*)								
northern saw-whet owl	*Aegolius acadicus*	c,r	o	o	o	o	yes	BONA
long-eared owl	*Asio otus*	g,r,c			r		no	BONA
*short-eared owl	*Asio flammeus*	g,s,fm,sm,bm	u	o	u	c	yes	BONA
burrowing owl	*Athene cunicularia*	g,d	r	r	r	r	no	????????
snowy owl	*Bubo scandiacus*	g,s,d,fm			r	r	no	BONA
*great horned owl	*Bubo virginianus*	wide	c	c	c	c	yes	BONA
*northern pygmy-owl	*Glaucidium gnoma*	c,r	u	u	u	u	yes	BONA

Common Name	Scientific Name	Primary Habitat	Sp	S	F	W	Breeding Range?	Habitat Source
*western screech-owl	*Megascops kennicottii*	r,c	c	c	c	c	yes	BONA
spotted owl	*Strix occidentalis*	c		o	o		yes	BONA
*barn owl	*Tyto alba*	wide	c	c	c	c	yes	BONA

Habitats: a - Aerial, usually observed in flight; b-beaches; bm - brackish marshes; c - coniferous forest; d - dunes; ds - dune swales; e- Eelgrass beds, Bay shores; fm - freshwater marshes; g - Agricultural grasslands; r - Riparian forests; sm - saltwater marshes; rb-Rocky beaches; m - mudflats ; o - Open water, lakes, creeks, ponds; om - open water marine; s - seasonal wetlands, mudflats, flooded fields; wide - Widespread, found in a variety of habitats

Seasons: Sp - Spring, March through May; S - Summer, June through August; F - Fall, September through November; W - Winter, December through February

*Abundance: a - Abundant, expected to be observed 80 to 100 percent of the time in appropriate habitat; c - Common: 60 to 80 percent; u - Uncommon: 30 to 60 percent; o - Occasionally: 10 to 30 percent; r - Rare: 0 to 10 percent; * - Birds known to nest locally; ! -Threatened/Endangered Species; # - Observed less than 10 times in the past 10 years*

BONA: Birds of North America

Fish

Common name	Scientific name	Population Resilience*	Population Res. data
Order ACIPENSERIFORMES (*sturgeons and paddlefishes*) **Family ACIPENSERIDAE** (*sturgeons*)			
green sturgeon	*Acipenser medirostris*	Low, minimum population doubling time 4.5 - 14 years	FisBase
Order ANGUILLIFORMES (*eels and morays*) **Family OPHICHTHIDAE** (*snake eels*)			
yellow snake eel	*Ophichthus zophochir*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
Order ATHERINIFORMES (*silversides*) **Family ATHERINIDAE** (*neotropical silversides*)			
topsmelt	*Atherinops affinis*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
jack silverside (jacksmelt)	*Atherinopsis californiensis*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
Order CARCHARHINIFORMES (*ground sharks*) **Family TRIAKIDAE** (*houndsharks*)			
soupfin (tope) shark	*Galeorhinus galeus*	Very low, minimum population doubling time more than 14 years	FisBase
brown smoothhound	*Mustelus henlei*	Low, minimum population doubling time 4.5 - 14 years	FisBase
leopard shark	*Triakis semifasciata*	Very low, minimum population doubling time more than 14 years	FisBase
Order CHIMAERIFORMES (*chimaeras*) **Family CHIMAERIDAE** (*shortnose chimaeras or ratfishes*)			
Spotted ratfish	*Hydrolagus colliei*	Low, minimum population doubling time 4.5 - 14 years	
Order CLUPEIFORMES (*herrings*) **Family CLUPEIDAE** (*herrings, shads, sardines, menhadens*)			
American shad	*Alosa sapidissima*	Low, minimum population doubling time 4.5 - 14 years	FisBase
Pacific herring	*Clupea pallasii*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
threadfin shad	*Dorosoma petenense*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
Family ENGRAULIDAE (*anchovies*)			
Californian anchoveta (northern anchovy)	*Engraulis mordax*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
Order GADIFORMES (*cods*) **Family GADIDAE** (*cods and haddocks*)			
Pacific tomcod	*Microgadus proximus*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase

Common name	Scientific name	Population Resilience*	Population Res. data
Order GASTEROSTEIFORMES (*sticklebacks and seamoths*) **Family AULORHYNCHIDAE** (*tubesnouts*)			
tube-snout	*Aulorhynchus flavidus*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
Family GASTEROSTEIDAE (*sticklebacks*)			
threespine stickleback	*Gasterosteus aculeatus*	High, minimum population doubling time less than 15 months	FisBase
Order HEXANCHIFORMES (*frill and cow sharks*) **Family HEXANCHIDAE** (cow sharks)			
broadnose sevengill shark	*Notorynchus cepedianus*	Very low, minimum population doubling time more than 14 years	FisBase
Order LAMPRIDIFORMES (*velifers, tube-eyes and ribbonfishes*) **Family TRACHIPTERIDAE** (*ribbonfishes*)			
king-of-the-salmon	*Trachipterus altivelis*	Low, minimum population doubling time 4.5 - 14 years	FisBase
Order MYCTOPHIFORMES (*lanternfishes*) **Family MYCTOPHIDAE** (*Lanternfishes*)			
northern lampfish	*Stenobrachius leucopsarus*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
blue lanternfish	*Tarletonbeania crenularis*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
Order OPHIDIFORMES (*cusk eels*) **Family OPHIDIIDAE** (*brotulas and cusk eels*)			
spotted cusk-eel	*Chilara taylori*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
Order OSMERIFORMES (*smelts*) **Family OSMERIDAE** (*smelts*)			
whitebait smelt	*Allosmerus elongatus*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
surf smelt	*Hypomesus pretiosus*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
night smelt	*Spirinchus starksi*	High, minimum population doubling time less than 15 months	FisBase
longfin smelt	*Spirinchus thaleichthys*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
eulachon	*Thaleichthys pacificus*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
Order PERCIFORMES (*perch-likes*) **Family AMMODYTIDAE** (*sand lances*)			
Pacific sand lance	*Ammodytes hexapterus*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
Family ANARHICHADIDAE (*wolffishes*)			
wolf-eel	*Anarrhichthys ocellatus*	Low, minimum population doubling time 4.5 - 14 years	FisBase

Common name	Scientific name	Population Resilience*	Population Res. data
Family CENTROLOPHIDAE (*medusafishes*)			
brown rudderfish (Medusafish)	*Icichthys lockingtoni*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
Family EMBIOTOCIDAE (*surfperches*)			
calico surfperch	*Amphistichus koelzi*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
redtail surfperch	*Amphistichus rhodoterus*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
shiner perch	*Cymatogaster aggregata*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
striped seaperch	*Embiotoca lateralis*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
spotfin surfperch	*Hyperprosopon anale*	High, minimum population doubling time less than 15 months	FisBase
walleye surfperch	*Hyperprosopon argenteum*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
silver surfperch	*Hyperprosopon ellipticum*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
white seaperch	*Phanerodon furcatus*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
pile perch (pile seaperch)	*Rhacochilus vacca*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
Family GOBIIDAE (*gobies*)			
arrow goby	*Clevelandia ios*	High, minimum population doubling time less than 15 months	FisBase
blackeye goby	*Coryphopterus nicholsi*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
tidewater goby	*Eucyclogobius newberryi*	High, minimum population doubling time less than 15 months	FisBase
bay goby	*Lepidogobius lepidus*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
Family LUVARIDAE (*louvar*)			
louvar	*Luvarus imperialis*	unknown	FisBase
Family MORONIDAE (temperate basses) FisBase			
striped bass	*Morone lineatus*	Low, minimum population doubling time 4.5 - 14 years	FisBase
Family PHOLIDAE (*gunnels*)			
penpoint gunnel	*Apodichthys flavidus*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
saddleback gunnel	*Pholis ornata*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase

Common name	Scientific name	Population Resilience*	Population Res. data
Family SCIAENIDAE (*drums or croakers*)			
white weakfish (white seabass)	*Atractoscion nobilis*	Low, minimum population doubling time 4.5 - 14 years	FisBase
white croaker	*Genyonemus lineatus*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
cabezon	*Larimus breviceps*	High, minimum population doubling time less than 15 months	FisBase
Family SERRANIDAE (*wreckfishes*)			
giant sea bass	*Stereolepis gigas*	Very low, minimum population doubling time more than 14 years	FisBase
Family STICHAEIDAE (*pricklebacks*)			
high cockscomb	*Anoplarchus purpurescens*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
monkeyface prickleback	*Cebidichthys violaceus*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
decorated warbonnet	*Chirolophis decoratus*	Low, minimum population doubling time 4.5 - 14 years	FisBase
giant wrymouth	*Cryptacanthodes giganteus*	unknown	FisBase
snake prickleback	*Lumpenus sagitta*	Very low, minimum population doubling time more than 14 years	FisBase
Family STROMATEIDAE (*butterfishes*)			
Pacific pompano	*Peprilus simillimus*	High, minimum population doubling time less than 15 months	FisBase
Family TRICHODONTIDAE (*sandfishes*)			
Pacific sandfish	*Trichodon trichodon*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
Order PETROMYZONTIFORMES (*lampreys*) **Family PETROMYZONTIDAE** (*lampreys*)			
Pacific lamprey	*Lampetra tridentata*	Low, minimum population doubling time 4.5 - 14 years	
Order PLEURONECTIFORMES (*flatfishes*) **Family CYNOGLOSSIDAE** (*tonguefishes*)			
California tonguefish	*Symphurus atricauda*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
Family PARALICHTHYIDAE (*large-tooth flounders*)			
Pacific sanddab	*Citharichthys sordidus*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
speckled sanddab	*Citharichthys stigmaeus*	High, minimum population doubling time less than 15 months	FisBase
California flounder (California halibut)	*Paralichthys californicus*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
Family PLEURONECTIDAE (*righteye flounders*)			
dover sole	*Microstomus pacificus*	Low, minimum population doubling time 4.5 - 14 years	FisBase

Common name	Scientific name	Population Resilience*	Population Res. data
starry flounder	*Platichthys stellatus*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
butter sole	*Pleuronectes isolepis*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
English sole	*Pleuronectes vetulus*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
c-o sole	*Pleuronichthys coenosus*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
curlfin sole	*Pleuronichthys decurrens*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
Pacific sand sole	*Psettichthys melanostictus*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
Order RAJIFORMES (*skates and rays*) **Family MYLIOBATIDAE** (*eagle and manta rays*)			
bat eagle ray	*Myliobatis californica*	Low, minimum population doubling time 4.5 - 14 years	FisBase
Family RAJIDAE (skates)			
big skate	*Raja binoculata*	Low, minimum population doubling time 4.5 - 14 years	FisBase
Family UROLOPHIDAE (*round rays*)			
Haller's round ray	*Urobatis halleri*	Low, minimum population doubling time 4.5 - 14 years	FisBase
Order SALMONIFORMES (*salmons*) **Family SALMONIDAE** (*salmonids*)			
cutthroat trout	*Oncorhynchus clarkii*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
Coho salmon	*Oncorhynchus kisutch*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
rainbow trout	*Oncorhynchus mykiss*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
Chinook salmon	*Oncorhynchus tshawytscha*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
Order SCORPAENIFORMES (*scorpionfishes and flatheads*) **Family AGONIDAE** (*poachers*)			
pygmy poacher	*Odontopyxis trispinosa*	High, minimum population doubling time less than 15 months	FisBase
tubenose poacher	*Pallasina barbata*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
pricklebreast poacher	*Stellerina xyosterna*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
Family COTTIDAE (*sculpins*)			
padded sculpin	*Artedius fenestralis*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
scalyhead sculpin	*Artedius harringtoni*	High, minimum population doubling time less than 15 months	FisBase

Common name	Scientific name	Population Resilience*	Population Res. data
bonehead sculpin	*Artedius notospilotus*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
rosylip sculpin	*Ascelichthys rhodorus*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
silverspotted sculpin	*Blepsias cirrhosus*	unknown	FisBase
sharpnose sculpin	*Clinocottus acuticeps*	High, minimum population doubling time less than 15 months	FisBase
coastrange sculpin	*Cottus aleuticus*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
prickly sculpin	*Cottus asper*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
buffalo sculpin	*Enophrys bison*	Low, minimum population doubling time 4.5 - 14 years	FisBase
red irish lord	*Hemilepidotus hemilepidotus*	Very low, minimum population doubling time more than 14 years	FisBase
brown irish lord	*Hemilepidotus spinosus*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
Pacific staghorn sculpin	*Leptocottus armatus*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
sailfin sculpin	*Nautichthys oculofasciatus*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
fluffy sculpin	*Oligocottus snyderi*	High, minimum population doubling time less than 15 months	FisBase
Family CYLOPTERIDAE (*snailfishes*)			
slipskin snailfish	*Liparis fucensis*	High, minimum population doubling time less than 15 months	FisBase
showy snailfish	*Liparis pulchellus*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
ringtail snailfish	*Liparis rutteri*	High, minimum population doubling time less than 15 months	FisBase
Family HEXAGRAMMIDAE (*greenlings*)			
kelp greenling	*Hexagrammos decagrammus*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
rock greenling	*Hexagrammos lagocephalus*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
lingcod	*Ophiodon elongatus*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
painted greenling	*Oxylebius pictus*	Medium, minimum population doubling time 1.4 - 4.4 years	FisBase
Family SCORPAENIDAE (*rockfishes, rockcods and thornyheads*)			
brown rockfish	*Sebastes auriculatus*	Low, minimum population doubling time 4.5 - 14 years	FisBase
copper rockfish	*Sebastes caurinus*	Low, minimum population doubling time 4.5 - 14 years	FisBase
yellowtail rockfish	*Sebastes flavidus*	Low, minimum population doubling time 4.5 - 14 years	FisBase

Common name	Scientific name	Population Resilience*	Population Res. data
black rockfish	*Sebastes melanops*	Low, minimum population doubling time 4.5 - 14 years	FisBase
vermillion rockfish	*Sebastes miniatus*	Low, minimum population doubling time 4.5 - 14 years	FisBase
blue rockfish	*Sebastes mystinus*	Low, minimum population doubling time 4.5 - 14 years	FisBase
bocaccio	*Sebastes paucispinis*	Low, minimum population doubling time 4.5 - 14 years	FisBase
grass rockfish	*Sebastes rastrelliger*	Low, minimum population doubling time 4.5 - 14 years	FisBase
Order SQUALIFORMES (*bramble, sleeper and dogfish sharks*) **Family SQUALIDAE** (*dogfish sharks*)			
piked dogfish (spiny dogfish)	*Squalus acanthias*	Very low, minimum population doubling time more than 14 years	FisBase
Order STOMIIFORMES (*lightfishes and dragonfishes*) **Family GONOSTOMATIDAE** (*bristlemouths*)			
benttooth bristlemouth	*Cyclothone acclinidens*	High, minimum population doubling time less than 15 months	FisBase
Order SYNGNATHIFORMES (*pipefishes and seahorses*) **Family SYNGNATHIDAE** (*pipefishes and seahorses*)			
bay pipefish	*Syngnathus leptorhynchus*	High, minimum population doubling time less than 15 months	FisBase
Order TETRAODONTIFORMES (*puffers and filefishes*) **Family MOLIDAE** (*Molas or ocean sunfishes*)			
ocean sunfish	*Mola mola*	Low, minimum population doubling time 4.5 - 14 years	FisBase

** Population Resilience Information from www.fishbase.org/*

Appendix L: Locally Occurring Special Status Species

Locally Occurring Special Status Species

Taxon	Scientific Name	Common Name	Status	Habitat Type	On HBNWR?	On CRNWR?
Amphibians	*Rana aurora aurora*	Northern Red-Legged Frog	CA: SSC	freshwater emergent wetland, riverine, wet meadow	yes	no
Birds	*Agelaius tricolor*	Tricolored BlackBirds	FED: BCC, CA: SSC	freshwater emergent wetland, pasture	yes, migratory	no
Birds	*Asio flammeus*	Short-Eared Owl	CA: SSC	wide variety of habitats	yes, winter	no
Birds	*Asio otus*	Long-Eared Owl	CA: SSC	wide variety of habitats	yes, migratory	no
Birds	*Athene cunicularia*	Burrowing Owl	CA: SSC, FED: BCC	annual, perennial grassland	yes, migratory	no
Birds	*Brachyramphus marmoratus*	Marbeled Murrelet	FED: Threatened, CA: Endangered; Critical Habitat	old growth forest, ocean	no	in water only
Birds	*Buteo swainsoni*	Swainson's Hawk	CA: Threatened	annual, perennial grassland	yes, migratory, very rare	no
Birds	*Chaetura vauxi*	Vaux's Swift	CA: SSC	riparian	yes, migratory	no
Birds	*Charadrius alexandrinus nivosus*	Western Snowy Plover (Pacific Coast Population)	FED: Threatened	shoreline, dunes	yes	no
Birds	*Chlidonias niger*	Black Tern	CA: SSC	marine, estuarine, wet meadow	yes, migratory, very rare	no
Birds	*Circus cyaneus*	Northern Harrier	CA: SSC	wide variety of habitats	yes, breed	no
Birds	*Coccyzus americanus*	Western Yellow-billed Cuckoo	FED: Candidate, CA: Endangered	open woodlands, dense shrub layers	yes, migratory	no
Birds	*Contopus cooperi*	Olive-Sided Flycatcher	FED: BCC, CA: SSC	Douglas-fir	yes, breed	no

Taxon	Scientific Name	Common Name	Status	Habitat Type	On HBNWR?	On CRNWR?
Birds	*Cypseloides niger*	Black Swift	FED: BCC, CA: SSC	grasslands	yes, migratory	no
Birds	*Dendroica petechia brewsteri*	Yellow Warbler	CA: SSC	montane riparian	yes, breed	no
Birds	*Elanus leucurus*	White-Tailed Kite	CA: Fully protected	freshwater, saline emergent wetland, annual grassland	yes	no
Birds	*Empidonax traillii*	Willow Flycatcher	CA: Endangered	montane riparian	yes, migratory	no
Birds	*Fratercula cirrhata*	Tufted Puffin	CA: SSC	marine, offshore rocks	no	yes, breed
Birds	*Haliaeetus leucocephalus*	Bald Eagle	FED: Delisted CA: Endangered, CA: Fully protected	wide variety of habitats	yes	no
Birds	*Icteria virens*	Yellow-Breasted Chat	CA: SSC	valley-foothill riparian	yes, migratory	no
Birds	*Lanius ludovicianus*	Loggerhead Shrike	FED: BCC, CA: SSC	wide variety of habitats	yes, migratory, very rare	no
Birds	*Melanerpes lewis*	Lewis' Woodpecker	FED: BCC	wide variety of habitats	yes, migratory, very rare	no
Birds	*Oceanodroma furcata*	Fork-Tailed Storm-Petrel	CA: SSC	marine, offshore rocks	no	yes, breed
Birds	*Pelecanus erythrorhynchos*	American White Pelican	CA: SSC	estuarine	yes, migratory, very rare	no
Birds	*Pelecanus occidentalis*	Brown Pelican	FED: Threatened CA: Endangered	marine	yes, migratory	yes, migratory
Birds	*Phoebastris albatrus*	Short-tailed Albatross	FED: Endangered	open ocean	no	migratory, in water only
Birds	*Progne subis*	Purple Martin	CA: SSC	wide variety of habitats	yes, migratory	no
Birds	*Riparia riparia*	Bank Swallow	CA: Threatened	valley-foothill riparian	yes, migratory, very rare	no

Taxon	Scientific Name	Common Name	Status	Habitat Type	On HBNWR?	On CRNWR?
Birds	*Sterna caspia*	Caspian Tern	FED: BCC	freshwater emergent wetland, marine, riverine, estuarine	yes, migratory	yes, migratory
Birds	*Strix occidentalis caurina*	Northern Spotted Owl	FED: Threatened; Critical Habitat	forest, multi-canopied	no	no
Birds	*Synthliboramphus hypoleucus*	Xantus's Murrelet	FED: Candidate, CA: Threatened	ocean, offshore islands	no	very rare, in water only
Fish	*Acipenser medirostris*	North American Green Sturgeon	CA: SSC, FED: Threatened Southern DPS; Proposed Critical Habitat for Southern DPS	riverine, marine, estuarine	yes, Bay	no
Fish	*Eucyclogobius newberryi*	Tidewater Goby	FED: Endangered, CA: SSC	riverine, estuarine	yes, breed	no
Fish	*Oncorhynchus clarki clarki*	Coast Cutthroat Trout	CA: SSC	estuarine	yes, migratory	no
Fish	*Oncorhynchus kisutch*	Coho Salmon - Southern Oregon / Northern California ESU	CA: SSC, FED: Threatened	marine, riverine, estuarine	yes, migratory	no
Fish	*Oncorhynchus mykiss*	Steelhead-Northern California ESU	FED: Threatened, CA: SSC	marine, riverine, estuarine	yes, migratory	no
Fish	*Oncorhynchus tshawytscha*	Chinook Salmon - California Coastal ESU	FED: Threatened	marine, riverine, estuarine	yes, migratory	no
Fish	*Spirinchus thaleichthys*	Longfin Smelt	CA: SSC	coastal waters, near shore	yes, Bay	no
Fish	*Thaleichthys pacificus*	Eulachon	CA: SSC	marine, riverine, estuarine	?	no
Mammals	*Arborimus albipes*	White-Footed Vole	CA: SSC	redwood	yes	no
Mammals	*Eumetopias jubatus*	Steller (northern) Sea-Lion	FED: Threatened	marine, offshore rocks	no	yes

Taxon	Scientific Name	Common Name	Status	Habitat Type	On HBNWR?	On CRNWR?
Plants	*Abronia umbellata ssp. brevifolia*	Pink Sand Verbena	CA: Special Plant	dune mat	yes	no
Plants	*Castilleja ambigua* ssp. *humboldtiensis*	Humboldt Bay Owl's Clover	CA: Special Plant	dune mat	yes	no
Plants	*Cordylanthus maritimus Benth.* ssp. *palustris*	Point Reyes Bird's-beak	CA: Special Plant	dune mat	yes	no
Plants	*Erysimum menziesii* ssp. *eurekense*	Humboldt Bay Wallflower	FED: Endangered, CA: Endangered	dune mat	yes	no
Plants	*Layia carnosa*	Beach Layia	FED: Endangered, CA: Endangered	dune mat	yes	no
Reptiles	*Emys (=Clemmys) marmorata marmorata*	Northwestern Pond Turtle	CA: SSC	wide variety of habitats	yes	no
Arthropods	*Icaricia icarioides missionensis*	Mission Blue Butterfly	FED: Endangered	annual grassland	no	no
Arthropods	*Lycaeides argyrognomon lotis*	Lotis Blue Butterfly	FED: Endangered	wet meadow	no	no
Amphibians	*Plethodon elongatus*	Del Norte Salamander	CA: SSC	wide variety of habitats	no	no
Arthropods	*Polites mardon*	Mardon Skipper	FED: Candidate	annual grassland	no	no
Arthropods	*Speyeria zerene behrensii*	Behren's Silverspot Butterfly	FED: Endangered	closed-cone pine-cypress	no	no
Arthropods	*Speyeria zerene hippolyta*	Oregon Silverspot Butterfly	FED: Threatened	perennial grassland, dunes	no	no
Arthropods	*Speyeria zerene myrtleae*	Myrtle's Silverspot Butterfly	FED: Endangered	dunes, coastal scrub	no	no
Arthropods	*Syncaris pacifica*	California Freshwater Shrimp	FED: Endangered, CA: Endangered	riverine	no	no

FED=listed under the Federal Endangered Species Act; CA=listed under the California Endangered Species Act; SSC=Species of Special Concern; BCC=Birds of Conservation Concern; DPS=Distinct Population Segment.

Listing Categories

California Endangered Species Act (CESA) Listing Codes:

- CA: E State-listed as Endangered
- CA: T State-listed as Threatened
- CA: CE State candidate for listing as Endangered
- CA: CT State candidate for listing as Threatened
- CA: CD State candidate for delisting

Endangered Species Act (ESA) Listing Codes:

- FED: E Federally listed as Endangered
- FED: T Federally listed as Threatened
- FED: PE Federally proposed for listing as Endangered
- FED: PT Federally proposed for listing as Threatened
- FED: PD Federally proposed for delisting
- FED: C Federal candidate species (former Category 1 candidates)
- FED: SC Species of Concern – list established by National Marine Fisheries Service (NMFS) *effective 15 April 2004*

Other Codes:

SSC: California Species of Special Concern. It is the goal and responsibility of the Department of Fish and Game to maintain viable populations of all native species. To this end, the Department has designated certain vertebrate species as "Species of Special Concern" because declining population levels, limited ranges, and/or continuing threats have made them vulnerable to extinction. More information is available on the Department's web site at: http://www.dfg.ca.gov/hcpb/species/ssc/ssc.shtml. All of the Species of Special Concern reports are now available on-line:
Birds: http://www.dfg.ca.gov/hcpb/info/bird_ssc.shtml.
Mammals: http://www.dfg.ca.gov/hcpb/info/mammal_ssc.shtml.
Fish: http://www.dfg.ca.gov/hcpb/info/fish_ssc.pdf.
Amphibians & Reptiles: http://www.dfg.ca.gov/hcpb/info/herp_ssc.pdf.

Fully Protected: The classification of Fully Protected was the State's initial effort to identify and provide additional protection to those animals that were rare or faced possible extinction. More information on Fully Protected species and the take provisions can be found in the Fish and Game Code, (birds at §3511, mammals at §4700, reptiles and amphibians at §5050, and fish at §5515). Additional information on Fully Protected fish can be found in the California Code of Regulations, Title 14, Division 1, Subdivision 1, Chapter 2, Article 4, §5.93. The category of Protected Amphibians and Reptiles in Title 14 has been repealed. The Fish and Game Code is available online at: http://www.leginfo.ca.gov/cgibin/calawquery?codesection=fgc. Title 14 of the California Code of Regulations is available at: http://ccr.oal.ca.gov.

BCC: US Fish and Wildlife Service has designated Birds of Conservation Concern: The goal of the Birds of Conservation Concern 2002 report is to accurately identify the migratory and nonmigratory bird species (beyond those already designated as Federally threatened or endangered) that represent our highest conservation priorities and draw attention to species in need of conservation action.

This report is available at: http://www.fws.gov/migratorybirds/reports/BCC2002.pdf

Appendix M: Public Involvement Process for the Humboldt Bay National Wildlife Refuge Complex CCP/EA

Public Involvement Process for the Humboldt Bay National Wildlife Refuge Complex CCP/EA

Advertisement of Public Scoping Meetings and Initiation of CCP/NEPA process

Prior to public scoping meetings the Complex issues a press release to many local media outlets including: local radio stations such as KHSU, KHUM , KSLUG, and KEKA; local newspapers such as the Eureka Times Standard, Eureka Reporter, Humboldt Beacon, Eco News, and the North Coast Journal; and local television stations such as FOX, ABC, NBC, and PBS (community calendar). Flyers advertising the public meetings were posted at community bulletin boards by members of the Service in January of 2007. A planning update was distributed to interested stakeholders that had been identified through other, prior Complex planning processes. Planning officially began when a Notice of Intent published in the Federal Register announcing the Service's intent to prepare a comprehensive conservation plan and environmental assessment for the Complex (Vol. 72, No. 18, p. 4020). The Notice of Intent requested that the public submit comments on the CCP by March 15, 2007. An issues workbook was also distributed to the mailing list and at public meetings to help focus public input.

Public Scoping Meetings

Three Public Scoping Meetings were held on February 13, 15, and 17 in Del Norte and Humboldt County to receive public input on the Complex comprehensive conservation plan and associated National Environmental Policy Act document. Each public scoping meeting consisted of a presentation by Service staff on the CCP/NEPA process, a presentation on the history of the Complex, questions and answers, and documentation of public comments. The majority of each public meeting was spent documenting public comments.

The first meeting was held on February 13, 2007 at the Del Norte Family Resource Center from 6:00 pm–8:30 pm in Crescent City, CA. Five members of the public attended the meeting as well as three members of the Service. The second meeting was held on February 15, 2007 at the College of the Redwoods from 5:30 pm–8:00 pm in Eureka, CA. Approximately 23 members of the public attended (23 signed in) the meeting as well as nine members of the Service. The third meeting was held on February 17, 2007 at the Humboldt Area Foundation from 2:30 pm–5:00 pm in Bayside, CA. Approximately 14 members of the public attended (14 signed in) the meeting as well as nine members of the Service. Members of the public attending the meetings were encouraged to also submit written comments by March 15, 2007. Copies of the Issues Workbook were distributed to interested stakeholders at the meetings.

Supplemental Request for Comments on Castle Rock NWR

Due to Castle Rock NWR's seasonal popularity, primarily related to birding events, the Service attempted to obtain additional public comment on the CCP by distributing a planning update to members of the public attending the annual Aleutian cackling goose festival during the week of April 2, 2007. The second planning update encouraged the public to provide comments on the future management of Castle Rock NWR by May 17, 2007.

Public Scoping Comments Received

A complete list of public comments received orally and in writing, during the public scoping process, are contained in Appendix M: Public Involvement Process. Hundreds of comments were received during the public scoping meetings, on a wide variety of Complex management topics. In total 14 completed issues workbooks were returned during the public scoping period. In total 13 letters or e-mails were received during the open comment period. In addition 3 sets of written comments were turned in during public meetings.

Summary of HBNWRC CCP Written Public Scoping Comments received during the open comment period from January 29 through March 15, 2007

In total 13 letters or e-mails were received during the open comment period. In addition 3 sets of written comments were turned in during public meetings.

Comments and suggestions from agencies, tribes and the public:

Humboldt Bay NWR Biological Resources Management

- Increase short grass habitat for Aleutian cackling geese and other species (1 comment)
- Use grazing animals, instead of machinery, to maintain pastoral lands (1 comment)
- Willing to see White Slough go tidal, but Hookton Slough Unit should be freshwater marsh (1 comment)
- Enhance existing properties for waterfowl (1 comment)

Humboldt Bay NWR Visitors Services

Hunting general

- Educate hunters about the value of sportsmanship and ethics on the Refuge (2 comments)
- Initiate pre and post season hunting meetings (1 comment)
- Update the Sport Hunting Management Plan (including recalculate the refuge acreage and re-evaluate the percentage of land presently open and closed to hunting, re-evaluate hunting of de-listed species) (1 comment)
- Enter into agreements with local and State agencies to enhance and protect sport hunting opportunities in and around Humboldt Bay (1 comment)

Hunting facilities/infrastructure

- Create retrieval zone at blinds D, 2, 4 and 14 along hunting/ no hunting boundary (1 comment)
- Improve blinds by adding more pit blinds and improving others (1 comment)
- There should be less blinds and they should be spaced farther apart (1 comment)
- Add a blind between #8 and #13 (1 comment)
- Acquire and enhance new hunting properties (1 comment)
- Want goose blinds/pits in eastern fields of Salmon Creek Unit (1 comment)

Hunting rules and regulations

- Increase LE, particularly to count the shells brought in (3 comments)
- Want season pass for hunting (3 comments)
- Add one hunt day/allow hunting on Thursday (2 comments)
- Allow hunting until sunset (2 comments)
- Conduct draw the night before hunt day (2 comments)
- Joining up should be allowed for the re-draw, provided all joining hunters were drawn in the morning (2 comments)
- The refill could be improved by allowing joining up with any card that was drawn at morning draw, this could bring in more $ and allow more hunting opportunity (2 comments)
- Want improved opportunities for pairing up during redraw (1 comment)
- A person should only be able to come for a chance to be drawn once per week (1 comment)
- Eliminate the second refill drawing (1 comment)
- Want review of D-blind draw rules (1 comment)
- Expand the hunting area (1 comment)
- Junior hunters should have a day a month or a day a week where only they are allowed to hunt (1 comment)

Hunting Salmon Creek Unit

- Overall Salmon Creek Unit drawn hunt is good (1 comment)

Hunting Hookton Slough Unit

- Want hunting access from Hookton Slough dock (1 comment)
- Provide hunting access to Hookton Slough off Toroni Rd. (1 comment)

- On specific days close motorized boat access to Teal Island (Hookton Slough Unit access) and only allow non-motorized access (1 comment)

Hunting Jacoby Creek Unit
- Want parking access at Jacoby Creek for hunting (1 comment)
- Improve access at Jacoby Creek Unit or develop an appropriate non-motorized boat launch (1 comment)

Hunting Eureka Slough Unit
- Improve hunter access at Eureka Slough, the location is suited to creation of non-motorized boat access (1 comment)

Dune Units facilities/infrastructure
- May want to consider speed bumps for Ma-le'l access, but not as severe as Salmon Creek Unit speed bumps (1 comment)
- Hiking trails of 3-6 foot width should only be used for Ma-le'l ADA accessible trails. Dune trails should be narrower, Class 4 trail designation, to preserve the integrity of the forest and dunes (1 comment)
- Railings should be 48" high for the Ma-le'l view deck for liability reasons (1 comment)

Dune Units rules and regulations
- Bikes going on the trail will be an ongoing issue for Ma-le'l (1 comment)
- Ma-le'l north entry: do not allow RVs or trailers, only allow non-motorized boat launch (1 comment)
- Consider contingency planning to close access based on actual or projected wind speeds detected on off shore buoys (1 comment)
- If the caretaker is a FWS employee, towing procedures may be o.k., but if not it may be best for the caretaker to notify headquarters (1 comment)
- Consider caretaker safety and training regarding towing of vehicles (1 comment)
- Make open/close/tow times for Ma-le'l the same as for the South Jetty for ease of understanding (1 comment)

Dune Units signage
- Ma-le'l boundary signage: too much signage is intrusive, recommend having the primary standard by LOS (1 comment)
- Redwood Gun Club entry: the "do not enter" sign is vague, noise from the gun club should be addressed in information provided to the public (1 comment)
- Lanphere Dunes boundaries are not clearly marked (1 comment)
- Rules for public use and dune unit boundaries should be clearly posted and maintained (1 comment)
- The boundary between Ma-le'l South and Ma-le'l North must be clearly posted because dogs are only allowed in the South (1 comment)
- Fences would be a clear boundary (1 comment)

Humboldt Bay NWR Cultural Resources Management
- The CCP should recognize and protect Wiyot cultural resources as mandated under Section 110 of the National Historic Preservation Act (1 comment)
- Include separate provisions for the protection of cultural resources, including archaeological and traditional cultural properties (1 comment)
- The refuge should employ a professional archaeological assessment of identified properties in consultation with Tribal representatives and develop procedural language to allow flexible management practices (1 comment)
- Acknowledge all Service regulatory responsibilities under the NHPA in CCP drafts (1 comment)
- Clarify the historic status determination for the Jacoby Creek hunting shack [under criteria A, broad patterns of history] (1 comment)
- The Humboldt Refuge is located within the ancestral and current territory of the Wiyot Tribe (1 comment)
- Many historic Wiyot village sites are located within the boundaries of the Refuge (1 comment)
- Should make provisions to consider a transfer of lands such that the Wiyot Tribe may acquire Refuge property located on Indian Island (1 comment)
- Consider co-management of lands within the Refuge boundaries held sacred by the Wiyot Tribe, when appropriate (includes Indian Island lands and potentially other Refuge lands) (1 comment)

- Coordinate with the Wiyot Tribe regarding the protection of sensitive cultural resources located on property owned by the Refuge (1 comment)
- Coordinate management and monitoring of species valuable to the Wiyot Tribe for subsistence and cultural purposes (1 comment)
- Coordinate with the Wiyot Tribe on refuge-scale and watershed-scale activities that may affect property held by the Wiyot Tribe and the resources valued by the Tribe (ie. water quality, cultural resource protection, habitat improvement, etc.) (1 comment)

Humboldt Bay NWR General Comments

- Want continued access to islands in Mad River Slough (1 comment)
- Leave white refuge signs in place and post greed boundary signs down the middle of the [Mad River] slough so that we can retrieve dead or wounded ducks (1 comment)
- Promote science based, service learning programs for 5th – 8th grade children on the Refuge (1 comment)

Castle Rock NWR Biological Resources Management

- The best way to manage Castle Rock NWR seabirds is to stay away from them (1 comment)

Castle Rock NWR Community Outreach

- Consider additional posters at Point St. George in conjunction with the Point St. George working group (1 comment)
- Informational flyers specific to Castle Rock should be developed and distributed to Redwood State and Nat'l Park visitors center, the Chamber of Commerce, through the Humboldt NWR and other locations (1 comment)
- Provide excursions, field trips, and courses using CRNWR to showcase wildlife concepts (1 comment)

Castle Rock NWR signage

- Signs should be posted along Pebble Beach Drive and at Anchor Way, in Crescent City Harbor, to educate kayakers and other users to the risk of disturbance, the potential impact on seabirds, and illegality of trespass or flushing wildlife (1 comment)
- Review content of signs along Pebble Beach Drive and possibly add new ones (1 comment)

Castle Rock NWR Research Comments

- Should fund a study to quantify sources, frequency and severity of disturbance [of seabirds and pinnipeds] on Castle Rock NWR (1 comment)
- Review the impact of research activities on Castle Rock NWR resources (1 comment)
- Continue photo surveys by remote camera for colony counts (1 comment)
- Monitor disturbance by staff landing on the island via a remote observer (1 comment)
- Additional remote sensing projects should be encouraged (ex. high resolution and thermal imaging aerial photography) (1 comment)
- Conduct on site flora and invertebrate surveys during the winter to avoid impacts to other wildlife (1 comment)
- The remote camera feed should be available to the public (1 comment)

Summary of HBNWRC CCP Verbal Comments Received During the Public Scoping Meetings on February 13, 15, 17, 2007.

Meeting #1 was held on 2/13/07 at the Del Norte Family Resource Center from 6:00-8:30 pm in Crescent City -5 members of the public attended the meeting as well as 3 USFWS staff (Eric Nelson, David Bergendorf and Amy Kocourek).

Meeting #2 was held on 2/15/07 at the College of the Redwoods from 5:30-8 pm in Eureka, CA -Approximately 23 members of the public attended (23 signed in) the meeting as well as 9 USFWS staff (Eric Nelson, Shannon Smith, Andrea Pickart, Patti Clifford, Steve Lewis, Dominic Bachman, Amy Kocourek, Emily Jenniings and David Bergendorf).

Meeting #3 was held on 2/17/07 at the Humboldt Area Foundation from 2:30-5 pm in Bayside, CA -Approximately 14 members of the public attended (14 signed in) the meeting as well as 9 USFWS staff (Eric Nelson, Shannon Smith, Andrea Pickart, Patti Clifford, Steve Lewis, Dominic Bachman, Amy Kocourek, Emily Jennings and David Bergendorf).

Comments and suggestions from the public follow:

Castle Rock NWR

Castle Rock NWR Biological Resources/Habitat Protection

- The refuge should look into rare salamanders that may occur on Castle Rock and the genetic importance of potential island populations [the Nature Conservancy may have some records].
- Should protect Castle Rock from watercraft disturbance, such as sea kayaks (speaker has witnessed flushing of birds and marine mammals by watercraft and people walking on the reef).

Castle Rock NWR Environmental Interpretation

Castle Rock NWR Facilities/infrastructure

- Transportation funds might be available for improvements including interpretive signage.
- The county (local transportation district) could apply for TEA21funds including restrooms, parking and interpretive signage.
- Need interpretive displays that connect the public (ie. Visitors) with Castle Rock and encourage "destination" visits to Castle Rock as well as raising awareness and understanding of the resources.
- Could develop a kiosk for Castle Rock, but it should not be immediately on the beach side (would be an eye sore).
- Should add interpretive panels that talk about Castle Rock related rules and how to prevent wildlife disturbance.
- Interpretive signs should be at Pebble Beach drive.

Castle Rock NWR Interpretive Activities

- Should explore using volunteers for interpretation (ex. Summer interns that could stay on local public lands such as state park land). Some students from Humboldt County might be interested.
- Most visitors find their own way to the Castle Rock area (they drive by) so the interpretive programs should be static and self-guided.

Castle Rock NWR Wildlife Observation/Photography

- Should research high powered remote sensing tools that can allow observation of wildlife at Castle Rock without disturbing the wildlife.
- Garth Reef is a good place for Castle Rock observation.

Castle Rock NWR Community Outreach

- Should develop a brochure for Castle Rock.
- Should develop a display for the Crescent City visitors center.
- A Castle Rock brochure could clearly indicate rules that apply to watercraft near Castle Rock and the brochures could be distributed to surf shops, etc.

- Should coordinate strategies of education vs. law enforcement with local organizations (ex. Articles in local papers, research who is actually disturbing wildlife so that that demographic can be targeted with an appropriate message).
- Point St. George and Castle Rock should integrate their interpretive programs (Point St. George is Del Norte County land).
- Should team up with Pebble Beach (county managed) for interpretive signage integration.
- Should team up with Redwood Park (Martha McClure-county supervisor) for interpretive signage integration.

Castle Rock NWR Potential Conflicts with Other Landowners

- Need data on the impact of overflights on birds at Castle Rock and need to clarify what are the regulations for overflights.
- Should try to avoid conflicts such as goose/plane conflicts if the planes are taking off while geese are in flight.

Castle Rock NWR Cultural Resources

- Smith River Rancheria has a good cultural resources historian, Loren Bommelyn, who may be able to supply information on native American use of Castle Rock.
- Research the Del Norte Airport expansion plan and get involved with that planning process. The airport expansion plan should also be addressed in the CCP.

Humboldt Bay National Wildlife Refuge

Humboldt Bay NWR Biological Resources/Habitat

Humboldt Bay NWR Aleutian cackling goose habitat management

- Maintain short grass, geese areas (seem to be doing a good job).
- Idea: Use burning to attract Aleutian cackling geese (experiment with this technique to compare burning with grazing and haying).
- If Aleutians (cackling geese) were here pre-European the native Americans may have been burning to maintain their habitat.

Humboldt Bay NWR Wetland management/restoration

- Maintain as much fresh water marsh habitat on the Salmon Creek Unit (there is not enough fresh water marsh habitat on the refuge).
- (maintain) drainage so neighbors and highway 101 are not flooded.
- Cooperative agreement with Arkleys to extend restoration up channel and deal with overbank flooding.
- (conduct) More restoration of tidal areas on southern units for fish habitat and salt marsh.

Humboldt Bay NWR Biological Surveys and monitoring

- Be sure to incorporate mammal population surveys and monitoring, especially with vegetation surveys.

Humboldt Bay NWR Invasive species management

- Control Spartina at Eureka slough and Jacoby Creek using weed eaters (get a bigger propane tank).

Humboldt Bay NWR Agricultural wetland management

- (should use) More grazing and less haying because of loss of clover.

Humboldt Bay NWR Other species management

- Re-introduce elk.
- Model the deer population, there may be too many.
- Use the HBWAC salmonid conservation plan.
- Do endangered species management to address sloughs beyond our boundary.
- More management of Table Bluff Unit.

Humboldt Bay NWR Hunting/Fishing Management

Humboldt Bay NWR Hunting facilities/infrastructure

- (should) Have pit tanks instead of blinds, take out the blinds.
- Expand the parking lot and/or expand the entrance road (when there are many people on the refuge they park on the roadside) for safety.
- Expand parking toward the eucalyptus trees as well as expanding the road in that area.
- The Salmon Creek hunting unit should have a call box and there should be a second call box next to the disabled blind (the call box should connect to the refuge office or to an outside line in case of emergencies).
- Make sure blind #12 and #13 are not in the same line of fire.
- Blind #10 needs a pond for the early season.
- Pits need new lids (too many frogs and other wildlife are stranded in them).
- Pits should be bailed before (the) season.
- Teal island (is) too close to (the) walking trail, Hookton trail and the Y blind is too near (the) trail for shooting.
- Hookton slough access encourages hunters to come in illegally.
- (should) Make Salmon Creek Unit parking area safer.
- Plant native vegetation around blinds (ex. willows, coyote brush) using volunteers.
- Re-design blinds so doors are positioned better & hunters can get their faces close to the front of the blind. Build up the ground so blinds are dry and native vegetation could survive (ex. #11 is a good example).
- Provide parking at Jacoby Creek cabin.
- Improve access at Eureka slough and provide a boat launch. (Possibly provide only non-motorized boats and cooperate with Target to build the launch).
- Improve and enhance hunter opportunities and access at White Slough, such as a launch for non-motorized boats.
- Improve and enhance hunter opportunities and access at Table Bluff, such as a bridge across the slough.

Humboldt Bay NWR Hunting rules and regulations

- Consider a HBNWR season hunting pass.
- Would like to see an annual use pass for hunting and other consumptive uses.
- Have a refuge hunting season pass instead of day pass and charge $35-$50 for the pass.
- (need a) Better spatial division between hunting vs. non-hunting.
- Should have waterfowl hunting on Mad River Slough and nearby islands (this area has traditionally been hunted, especially by physically fit hunters).
- Refuges should be user friendly (for consumptive users, ex. Hunting [waterfowl] and fishing [clamming, crabbing, trolling]).
- (it is) not logical to use the excuse of bird disturbance for no access to the lower marsh for birder(s).
- (should) Hold Salmon Creek Unit lottery draw the night before (for hunt program).
- Make it so that a representative from the whole party could submit a group card for the lottery the night before, with a morning sweat line.
- Draw for both hunt days on one evening, such as Friday night for both Saturday and Tuesday hunts.
- Clarify legal access and hunting use at Jacoby Creek Unit.
- Provide walk on, free-roam hunting at Jacoby Creek Unit.
- Find out if launching behind Target is legal.
- Facilitate and improve hunting opportunities.
- Improve hunter access at existing areas.
- Consider controlled hunting access at Hookton Slough (i.e. for non-motorized boats only).
- Do not exclude hunter use at Hookton due to perceived user group conflict.
  Manage controlled hunt of Teal Island and Hookton Slough through access at Hookton and regulated use (i.e. non-motorized boats).
- Increase refuge area available for hunting access.
- Consider allowing faxed or mailed cards for evening draw (to) accommodate hunters from out of area.
- Update sport hunting decision document package (i.e., update land status, Aleutian cackling geese and other species status, and percentage of land for hunting).

Humboldt Bay NWR Arguments to Limit Hunting/Fishing

- A person who lives 3 miles away would like to see hunting stopped. He hears shots all the way up the valley.
- Hunting and environmental education are mutually exclusive.
- Hunting devalues the asset that the refuge is.
- Should decrease hunt opportunities to allow other uses to increase.
- Hunting is not a valid management of migratory bird (populations), alternatives include compensating farmers, grass selection and developing more refuges.
- Would like to see the refuge as an actual refuge from hunting and harassment (no hunting should be allowed).
- Give wildlife a safe haven (on the refuge).
- Focus more on environmental education and less on hunting.
- Increase priority of education and observation vs. hunting.

Humboldt Bay NWR Environmental Education and Interpretation

Humboldt Bay NWR Environmental Education

- Offer salt marsh focused environmental education.
- Have an area to dip net and explore the salt marsh, brackish marsh and fresh marsh.
- Highlight similarities and differences of organisms and habitats.
- Write up each field trip program and gather teacher feedback.
- Refuge should provide materials to sample invertebrates (ex. Dip nets, kick nets) and a key to invertebrates (ex. Stoneflies, mayflies, damselflies, dragonflies).
- (offer) Natural history, natural resources, habitat, flora/fauna, education/interpretation – (Emphasize interconnectedness).
- Educate the public on the flora and fauna to inform them about the whole ecosystem.
- (the refuge) Should have a hunting information kiosk in the visitors center
- Focus on environmental education.

Humboldt Bay NWR Interpretation

- Have more interpretation about what management is going on at the refuge.
- (offer) Natural history, natural resources, habitat, flora/fauna, education/interpretation – (Emphasize interconnectedness).
- Help the public understand through interpretation, how hunter groups have helped the refuge and wildlife through financial contributions.
- (should offer) Interpretation about hunters targeting neck marked geese.
- Expand the interpretation on vegetation types and habitats in the visitors center.
- Nothing in the visitors center is about hunting.

Humboldt Bay NWR Community Outreach

- Increase understanding of volunteer program opportunities.
- (should have) Improved coordination with state wardens.
- (should have) Coordination with Manila Community Services District (MCSD).
- (should have) Coordination with the Friends of the Dunes purchase of the Stamps property.
- Educate Manila community (about) rare and important species.
- Educate public about access possibilities at Ma-le'l.
- (the) Refuge should educate public about how duck stamps/hunting/fishing taxes fund conservation of wildlife.
- Educate non-hunters about what hunters do besides hunt (ie. Fund conservation [for] refuges).
- Have a forum where students working on the refuge present their research findings.
- Dominic should give a talk on his research and others.
- Do outreach about existing partnerships (ie. Agriculture community and Aleutian goose working group.
- Make research from Humboldt State University, etc. available such as online and in a research library.
- Incorporate more research at the junior high and high school levels.
- Identify projects (that) kids would be excited to research.
- Establish relationship with K-12 schools to develop fundable programs.
- Create boating programs and water quality studies with kids in mind.

Humboldt Bay NWR Website

- Have vegetation maps on (the refuge) website showing different vegetation types.
- (should develop a) Newsletter to communicate research and update the website with research results.

Humboldt Bay NWR Wildlife Observation and Photography

- Create a less visible photoblind, such as a pit blind.
- Create additional photoblind(s) for other light or other scenery.
- More emphasis should be placed on wildlife observation.

Humboldt Bay NWR Policy/Law Enforcement Comments

- (should have) More law enforcement on the Salmon Creek unit.
- (there are) Too many dogs off leash in the parking lot with no enforcement.
- At hunting check stations have more regulations about bag limits and have that information discussed every Saturday before the hunt.
- (should install a) Security, surveillance camera at the Hookton Slough Unit parking lot.
- Hire refuge law enforcement.
- Charge everyone a daily entrance fee (ex. Birdwatchers, walkers), (but) let a hunting and fishing license be a waiver.
- (there should be) No entrance fee. Keep something free for people to enjoy (No entrance fee makes the refuge accessible to people of all income levels).
- Educate (the) public to keep dogs on leash and allow dogs in the Ma-le'l Dunes unit.
- Refuge should not present duck stamp/hunting/fishing taxes as the only funding of conservation (refuge is supported by taxes from public, donations as well as duck stamps).

Humboldt Bay NWR Non-Wildlife Dependent Recreation

- Create kayak access site at Table Bluff.
- Establish a paddle in access site for overnight (camping) use.
- Establish a 2-3 week day camp for kids (see Maggy H.).
- Develop kayak access at Ma-le'l.
- More kayak access on S areas (Table Bluff Unit).
- Consider dogs on leashes as seasonally appropriate on Hookton or another Salmon creek unit.
- Provide a doggy bag station (re-use plastic newspaper bags).
- Maintain quality of kayak launch and restrooms at Hookton (unit).
- Would like to see dog training (field trials for hunting dogs).
- Consider mosquito management and (management's impact) on neighbors.
- (want to know) What will be done to control (exclude) dog access at the Ma-le'l Unit.

Humboldt Bay NWR Signage

- Can not read property line signs (ex. Jacoby Creek, Eureka, Wiggins tract [currently it is poorly marked]).
- Improve signs on the refuge property.
- Should mark (sign) foot access corridors for the Jacoby Creek Unit and other parts of the refuge.
- Put up a "No free roam" (hunting) sign in the Salmon Creek Unit hunting area
- Blinds need to be re-signed.

Humboldt Bay NWR Cultural Resources Management

- Restore the historic Ranch House and Barn as a part of the heritage of Humboldt County.
- Be sure all cultural resources are considered.
- Make sure the CCP complies with the National Historic Preservation Act.
- Make preservation of the hunting shack at the Jacoby Creek Unit a high priority as well as the McBride barn (including the historic landscaping).
- The Jacoby Creek Unit hunting shack was found to be a significant historic property under the SHPO criteria in 1990.
- Be cautious about expanding wetlands to the detriment of historic properties.
- Protect historic sites at the Ma-le'l Unit.
- Protect shell midden sites at Salmon Creek Unit (i.e. sites near railroad tracks and Arrowhead Point).
- Make sure that all cultural resources are considered (ie. protected and accessible to the Wiyot for traditional uses).

Humboldt Bay NWR General comments

- (there is) More money to be made off of eco-tourism than will be made off of hunting.
- Promote more ecotourism on refuge, (which will) support the local economy.
- Birdwatchers/photographers do not take wildlife.
- Photographers do take wildlife pictures.
- Hunters, photographers and birdwatchers should work together.
- (the speaker is) Concerned about overpopulation of deer.
- Consider contaminants from old dump site on Table Bluff with respect to management of (the) Hookton Slough west end.
- (the speaker expressed) Concern over restricted access at the Ma-le'l Dunes Unit due to presumed impacts.
- Appreciate the building improvements.
- Enhance existing property.
- Keep doing what you are doing.

Coordination with others

- Develop partnerships.
- Long term plans (should) reflect global warming issues.
- Consider efficiency of our own management in regards to global warming.
- Acquire and enhance property.
- Should acquire land at the mouth of the Elk River at the old rendering plant. acreage (land between 101 & Tompkins Hill Road).
- Management of Eureka Slough Unit (coordination with Harbor District Mitigation sites, i.e. Park St. Marsh).
- Coordination with the City of Eureka. Educate City on the value of their sloughs. Their sloughs are an extension of the Unit.
- Work with existing Ecosystem-based Management program to be sure refuge system and goals are incorporated.

Facilities/infrastructure

- Please keep Hookton boat dock and trail open.

Staffing

- Keep the refuge open on Sundays.
- More staff would be good (volunteers sometimes can not answer questions or provide misinformation).

Summary of HBNWRC CCP Issues Workbook Comments Received During the Open Comment Period from January 29 Through March 15, 2007

In total, 14 completed issues workbooks were returned during the open comment period.

A summary of entries into the issues workbooks follows:

1. What activities do you engage in on Humboldt Bay Refuge or plan to in the near future?
- Hunting (8 comments)
- Wildlife observation (6 comments)
- Walking/hiking (5 comments)
- Fishing (4 comments)
- Photography (3 comments)
- Kayaking (1 comment)
- Environmental education (1 comment)
- Aleutian goose management (1 comment)
- Salmon Creek fisheries (1 comment)
- Visitor education (1 comment)

2. What things do you value most about the Refuge?
- Access to hunting/fishing (5 comments)
- Wildlife viewing (3 comments)
- Public access (3 comments)
- Wetlands (2 comments)
- Scenic beauty (2 comments)
- Knowing there is habitat for so many species of flora and fauna (1 comment)
- Openness (1 comment)
- Solitude (1 comment)
- Relative (given hunting noise) quiet and sounds of birds (1 comment)
- Visibility/tourism (1 comment)
- Staff (1 comment)
- Nothing, it takes away publicly accessible land (1 comment)
- It is close to home (1 comment)

3. In a sentence or two, describe your future vision for the refuge. You may want to list a vision for wildlife, habitats, visitor services or other aspects of the refuge
- More walking trails available, more native plants, wildlife viewing areas and activities (other than hunting) promoted
- The refuge should not cause problems for neighboring properties (ex. drainage or lack of feed for geese)
- A refuge managed for hunting and maximizing hunting opportunities
- Continued limitation on hunting, closing portion of Teal Island to hunting (too close to the Hookton Trail), continued free access to the Refuge, another hiking trail or two, and extended hours
- Multi-purpose habitat with lots of restoration potential and all current uses should be maintained
- To see better understanding between hunters and non-hunters and for non-hunters to be educated about how hunters financially support refuges
- Properly managed for opportunities for everyone to hunt and fish
- To see it managed for additional opportunities for hunting
- When waterfowl are doing good the Refuge should be flexible to accommodate more hunter opportunities and areas around the Refuge should not be closed to hunting
- Allow hunting without regulations that favor closing additional areas
- The Refuge should stop buying public lands and limiting use on those lands
- The Refuge should be for wildlife, especially birds, and more trails on the outer dikes throughout the Refuge. Some diked areas should be restored to salt marsh
- Educate people about sources of funding for Refuges and how to cooperate to benefit wildlife and habitat
- The Refuge should stay the way it is, but have more chances to hunt

4. What do you consider the most important problems facing the Refuge today? (List up to 3 in order of importance)

- Conflicts between hunters and other refuge users (2 comments)
- Staff using personal vision to manage the Refuge (2 comments)
- Methods of allowing hunting (the draw) (2 comments)
- Health of eelgrass beds (1 comment)
- Pollution in Humboldt Bay (1 comment)
- Enforcing Refuge rules (ex. ATV use on Dunes) (1 comment)
- Limited access to the Salmon Creek Unit for 2 days per week (want more access) (1 comment)
- Lack of clarity regarding huntable areas and CDFG hunting regulations (1 comment)
- Conflict between hunting and nature conservation (1 comment)
- Aleutian goose management (1 comment)
- Dike failure (1 comment)
- Lack of funding (1 comment)
- Bureaucracy trying to close it down, to prevent public enjoyment (1 comment)
- (too many) Controlling staff at the refuge (1 comment)
- Only being able to hunt 2 days per week (1 comment)
- No trespassing signs in the sloughs (1 comment)
- Using the Refuge to provide hunting opportunities (1 comment)
- Equal charges for Refuge users, currently only hunters pay $5/day (1 comment)
- Too many hunters in a small area (1 comment)
- How to limit its expansion (1 comment)
- Sea level rise will impact Refuge resources, making dike maintenance key (increase width and strength) (1 comment)
- Restoration of habitats to increase biodiversity (1 comment)
- People's attitudes about how things should be done on refuges (1 comment)
- Need more habitat (1 comment)
- Water resources should be managed better (1 comment)

5. What technical services would you like the Refuge staff to provide? (check if appropriate)

- Management to benefit wildlife/fisheries (12 comments)
- Wetland management (6 comments)
- Control of invasive and non-native species (4 comments)
- Enhanced educational services (4 comments)
- Habitat enhancement on private lands (3 comments)
- Volunteer opportunities (3 comments)
- Enhanced visitor services (3 comments)
- Need more law enforcement, there is none (2 comments)
- Education on such topics as a lecture the human and natural history of the lands that are now part of the Complex (Dune walks are good, but would like to know more about the wetland units) (1 comment)
- Provide more hunt opportunities (1 comment)
- Manage more areas for waterfowl (flooded) (1 comment)
- Maintaining trails for bird watching (1 comment)

6. Please indicate here any additional comments you wish to make on values, vision, or the Service's role.

- Hunting seems to be promoted over other uses on the Refuge (1 comment)
- Gunfire is not enjoyable for non-hunters visiting the Refuge (1 comment)
- Limit hunting times at the Refuge so that other users can enjoy the natural resources (1 comment)
- Be pro-hunting (2 comments)
- With so little natural habitat left for wildlife, the Refuge should resist pressure from hunters to open more areas to hunting (1 comment)
- Excellent staff (1 comment)
- Current hours of operation are a great benefit to visitors (1 comment)
- Should balance salt marsh conversion with goose habitat improvements (1 comment)
- Hunting areas should not be closed down by the Refuge (1 comment)
- Concentrate on what attracts waterfowl (1 comment)
- There should be more interactions with local schools including the College of the Redwoods, in particular involving students in studies on the Refuge as a way to teach them about Refuge habitats (1 comment)

- Hunting season passes should be available (1 comment)
- Would like to seem more photo blinds on the Refuge (1 comment)
- Add an additional hunting day or extend hunting from 3 pm to sunset (1 comment)

7. What role would you like the Complex to play in the conservation of natural areas and wildlife, regionally in Humboldt County?

- More people should be educated about the benefits and taught about the Refuge's value (through refuge visitor programs) (2 comments)
- A minimal role specifically aimed at enhancing waterfowl habitat and populations for hunting (1 comment)
- Minimal role (1 comment)
- Continue to work with CDFG, Loleta Tribe, and Humboldt County on issues related to land use, conversions and restoration (1 comment)
- Would like to see the refuge expand beyond current boundaries to acquire additional wetlands (1 comment)
- Less natural, protected areas and more public access (1 comment)
- Manage these areas for activities that really affect the complex, and do not remove areas from hunting (1 comment)
- If purchasing more areas, the huntable area should be expanded (1 comment)
- Open more Refuge lands to hunting (1 comment)
- Showing leadership on estuarine restoration plans and projects around the bay (1 comment)
- As a care taker and enhancer with the help of the public (1 comment)

Fish, Wildlife, Plants and Their Habitats

1. Are any of the following issues a major concern to you on the Refuge? If so, please check (or number in priority order) your top choices.

- Haying or grazing (6 comments)
- Aleutian cackling goose management (5 comments)
- Refuge in holdings and boundary issues (5 comments)
- Water rights and related issues (4 comments)
- Lack of active management to improve wildlife habitat (3 comments)
- Fish habitat restoration (3 comments)
- Control of invasive plant species (1 comment)
- Water quality (1 comment)
- Dune and salt marsh conservation (1 comment)
- Endangered and rare plant conservation (1 comment)
- Lead bullets and sinkers, for fishing, should not be allowed (1 comment)
- Access to lands (1 comment)

2. If possible, please provide additional details on why you selected the above choices. In particular we would be interested to know specific locations of concern.

- Haying and grazing is good to allow new growth of grasses and support waterfowl (2 comments)
- Would like the Island on Mad River Slough, which are now part of Ma-le'l Dunes to remain open to hunting (2 comments)
- Grow grain instead of grass (2 comments)
- The Refuge should not keep closing areas to hunting (2 comments)
- Hunting of Aleutian cackling geese should be allowed on farmer's lands to drive geese to wildlife areas (1 comment)
- Production of Aleutian cackling geese feed on the refuge takes grazing pressure off my nearby lands (1 comment)
- Maintaining drainage on the refuge effects drainage on nearby land (1 comment)
- Get the signs out of the waters in Jacoby Creek and Hookton Slough and Mad River Slough (1 comment)
- Remove boundary signs from north bay and south bay tidal flats (1 comment)
- Walking on trails does not feel safe when hunting is occurring (1 comment)
- Would like to have hunter access to Hookton slough at the boat dock off Toroni Rd. and would like Jacoby Creek to remain open to foot traffic via Jacoby Creek itself (1 comment)
- Haying and grazing should be expanded (1 comment)
- Controlling invasive plants, particularly in salt marshes around Humboldt Bay, is a huge issue (1 comment)

- Water quality may become an issue when the Salmon Creek restoration is complete especially relative to fish passage and fish habitat (1 comment)

3. Please include here any additional comments on fish and wildlife habitat issues and concerns.
- Hunting should be restricted to birds that are numerous and will actually be eaten (ex. mallards, Canadian geese) (1 comment)
- Grown grain instead of grass as it attracts more waterfowl (1 comment)
- Everyone pays (an) equal share for uses (1 comment)
- Managing access to foot or boat traffic is needed, but closing areas to trespass is wrong (1 comment)
- Stop buying up public lands (1 comment)
- Trails have improved greatly over the past 10 years (1 comment)
- Improve the website and keep it updated at least every 3 months (1 comment)

Recreation, Education, and Access

1. Are any of the current activities, or the current levels of use on the Refuge a concern to you?
- Would like to see increased hunting opportunities on the Refuge (2 comments)
- The refuge should manage short grass habitat with cattle, with grazing only allowed during the right time of year to provide geese with the most feed possible (1 comment)
- To be consistent with other refuges you should allow at least 3 hunt days per week (1 comment)
- Need more use days (1 comment)
- Free bird watching in inequitable, other refuges charge for day use (1 comment)
- There is not enough duck hunting (1 comment)
- Hunting of waterfowl should not be allowed on the Refuge (1 comment)
- Hunters should have to declare their harvest at the end of the day, and staff should be trained to know what they are looking at (bird identification) (1 comment)
- Should have a fee for bird watching (1 comment)

2. Do current Refuge recreational facilities meet your needs (trails, parking, signs, etc.)? Please explain.
- There should be more trails for non-hunters (1 comment)
- Would like to see a public boat ramp at the parking lot/dock off Hookton Road, to allow hunter access to Hookton Slough and Teal Island (1 comment)
- Trails should be longer (1 comment)
- There are too many signs and closed areas (1 comment)
- Yes (2 comments)
- Yes, but add funding for regular maintenance of the Hookton Road and parking area, particularly the entrance to Hookton parking (1 comment)
- Yes, but more trails would be nice (1 comment)

3. Are any of the following visitor service and public use issues a major concern to you on the Refuge? If so, please check (or number in priority order) your top choices.
- Access or trespass (4 comments)
- Illegal hunting (3 comments)
- Lack of wildlife related visitor services (ex. education, information, hunting) (3 comments)
- Cultural/historic resource preservation (ex. maintain barn at HQ) (2 comments)
- Lack of wildlife related visitor services on the Refuge (2 comments)
- Possible conflicts between public uses/facilities and wildlife/habitat values (1 comment)
- Walkers scaring birds (1 comment)
- Bird watchers and the general public should pay or buy some type of pass or bird stamp, or should have a fishing license (1 comment)

4. Please indicate here any additional comments on recreation, education, and public access.
- Hunting should be allowed in Hookton Slough/Teal Island and Mad River Slough 7 days per week to be consistent with CDFG code (2 comments)
- Dog walking should not be banned (1 comment)
- Do not block public views of the North Fields of the Salmon Creek Unit, so that people (driving by) can see deer and birds and understand that the land is a refuge (1 comment)

- Would like to see a newsletter or website that would explain projects ongoing at the Refuge (e.g., Aleutian cackling geese grass work, Salmon Creek project, etc.) (1 comment)
- Need more of it (1 comment)
- Manage Salmon Creek to increase hunter opportunities (1 comment)
- CDFG hunting codes are adequate and the Federal government should not bring in new laws (1 comment)
- Should encourage more hunting (1 comment)

5. Castle Rock NWR is not currently open to public visitation, but are there any Visitor Services that you feel should be provided nearby?

- Public visitation should be limited on the Refuge (1 comment)
- This is a good idea and should be left untouched (1 comment)
- Open it to hunting (1 comment)
- Content with it remaining a true Refuge for seabirds (1 comment)
- Set up a live feed from Castle Rock to the internet webcam so that people can observe the birds (1 comment)

Appendix N: Humboldt Bay National Wildlife Refuge Complex History

Humboldt Bay NWR Complex History

1969 HBNWR proposed

1971 HBNWR established

1974 HBNWR added to SF Bay NWR Complex

1974 The Nature Conservancy (TNC) purchases easement on Lanphere Dunes

1979 FWS purchases Castle Rock from TNC to establish Castle Rock NWR

1982 Friends of the Dunes (FOD) established

1985–1988 Lanphere Dunes expansion and office built

1988 FWS purchases McBride Ranch (now Salmon Creek Unit); triples Refuge acreage

1989 HBNWR Management Plan and Environmental Assessment (EA) approved

1993 HBNWR excavates westernmost portion of historic Salmon Creek channel

1997 National Wildlife Refuge System Improvement Act clarifies refuge mission

1997 HBNWR Complex separates from SF Bay NWR Complex management

1997 TNC donates Lanphere Dunes to HBNWR Complex

2001 Added Deputy Refuge Manager position; Refuge Manager Richard J. Guadagno killed on Flight 93 on 9/11

2002 Refuge Office and Visitor Center construction completed, Aleutian cackling geese begin staging in Humboldt County grasslands in large numbers

2002 Richard J. Guadagno Headquarters and Visitor Center dedicated in May

2003 Interpretive dioramas in Visitor Center unveiled during Refuge Centennial Celebration

2005 The 160-acre Ma-le'l Dunes Unit (aka. former Buggy Club), added to Refuge with assistance of California Coastal Conservancy and Center for Natural Lands Management

2005 Formation of independent "South Bay" Friends Group

2006 Lower Salmon Creek Delta Restoration begins with assistance of Pacific Coast Wetlands Wildlife and Restoration Association, California Department of Fish and Game, and Arcata Fish and Wildlife Office (AFWO)

2006 Remote cameras deployed at Castle Rock NWR in collaborative project with Humboldt State University, AFWO, National Park Service, and US Coast Guard to gather baseline data on nesting seabirds

2006 Begin data gathering process including vegetation mapping of entire Refuge, begin pilot study on methods of *Spartina densiflora* control

2007 Lanphere Dunes Unit office expanded, new tide gate installed in Salmon Creek Overflow

2008 Replace Salmon Creek tide gate

Appendix O: List of Preparers

List of Preparers

Dominic Bachman: U.S. Fish and Wildlife Service, Humboldt Bay NWRC

David Bergendorf: previously with the U.S. Fish and Wildlife Service, California and Nevada Region

Sean Brophy: Visitor Services Assistant, U.S. Fish and Wildlife Service, Humboldt Bay NWRC

Patricia M. Clifford: Natural Resource Specialist, U.S. Fish and Wildlife Service, Humboldt Bay NWRC

Deborah Jaques: Consultant, Pacific Eco Logic

Emily Jennings: previously with the U.S. Fish and Wildlife Service, Humboldt Bay NWRC

Amy Kocourek: previously with the U.S. Fish and Wildlife Service, Humboldt Bay NWRC

Steven F. Lewis: U.S. Fish and Wildlife Service, Humboldt Bay NWRC

Alexandra Morton: Natural Resource Specialist, U.S. Fish and Wildlife Service, California and Nevada Region

Eric T. Nelson: Project Leader, U.S. Fish and Wildlife Service, Humboldt Bay NWRC

Sandy Osborn: National Wildlife Refuge Planner, U.S. Fish and Wildlife Service, California and Nevada Region

Scott Owen: U.S. Fish and Wildlife Service, Humboldt Bay NWRC

Andrea Pickart: Ecologist, U.S. Fish and Wildlife Service, Humboldt Bay NWRC

Anan Raymond: Regional Archaeologist Region 1+Region 8 Cultural Resource Team, U.S. Fish and Wildlife Service, Region 1

Richard Smith: Natural Resource Planner, U.S. Fish and Wildlife Service, California and Nevada Region

Shannon Smith: Deputy Refuge Manager, U.S. Fish and Wildlife Service, Humboldt Bay NWRC