

Appendix A – Glossary of Terms

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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.

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.

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).

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 (AU) - Defines forage consumption on the basis of one standard mature 1,000-pound cow, either dry or with calf up to 6 months old; all other classes and kinds of animals can be related to this standard.

Animal-unit-day (AUD) - The amount (26 pounds) of air-dry forage calculated to meet one animal unit's requirement for one day.

Animal-unit-month (AUM) - The amount (780 pounds) of air-dry forage calculated to meet one animal unit's requirement for one animal unit for one month. Or, the amount of air-dry forage necessary to maintain one 1,000-pound animal for one month.

Approved acquisition boundary - The approved acquisition boundary includes those lands that the Service has authority to acquire for a refuge. This boundary often encompasses both public and private land, but does not imply that all private parcels within the boundary are targeted for acquisition.

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.

Browse - That part of a leaf and twig growth of shrubs, woody vines and trees available for animal consumption.

Bunch grass - A grass having a growth habit of a bunch, lacking stolons or rhizomes.

California Special Concern Species - 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.

Carrying capacity - The average number of livestock and wildlife that may be sustained on a management unit compatibly with management objectives. It is a function of site characteristics, and management goals and intensity.

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).

Class of animal - Description of age and sex group for a particular kind of animal (e.g., cow, calf, yearling heifer, ewe, fawn).

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.

Continuous grazing - The grazing of a specific unit throughout a year, growing season, or that part of a year when grazing is feasible.

Cool-season plant - A plant that generally makes the major portion of its growth during the late fall, winter, and spring.

Cover - The plant or plant parts, living or dead, on the ground surface. The proportional area of ground covered by plants on a stated area.

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.

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).

Euro American - 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. Often used to describe 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 nonspecific 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 United 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.

Forage - Browse and herbage that are available for food for grazing animals or may be harvested for feeding. Forage production: the weight of forage that is produced within a designated period of time on a given area (e.g. pounds per acre).

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

Forbs - Herbaceous dicotyledonous plants (e.g., non-woody, broad-leafed, low-growing plants other than grasses).

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 (mushrooms, puff balls, etc.). The kingdom includes the yeasts, molds, smuts, and mushrooms.

GIS - Geographic Information System; a computer system that allows information about land to be mapped. Different characteristics, such as vegetation or soil types, are stored as separate "layers." The layers can be combined to display interactions of characteristics. 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.

Grazing management - The control of grazing and browsing animals to accomplish a desired result.

Grazing preference - (1) Selection of plants or plant parts, over others by grazing animals. (2) In the administration of public lands, a basis upon which grazing-use permits and licenses are issued.

Grazing pressure - An animal-to-forage relationship measured in terms of animal units per unit weight of forage at any instant.

Grazing system - Grazing management that defines the periods of grazing and non-grazing.

Grazing unit - A grazing area enclosed and separated from other areas by fencing or other barriers.

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.

Introduced species - A species that is not a part of the original fauna or flora of a given area.

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

Invader - Plant species that were absent in undisturbed portions of the original vegetation of a specific range site and will invade or increase following disturbance or continued heavy grazing.

Inventory - A survey of natural resources; a description of existing resources.

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 crust-like 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.

Monitoring - The orderly collection, analysis, and interpretation of resource data over time to evaluate progress toward meeting management objectives.

Native species - A species that is a part of the original fauna or flora of a given area.

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 of the Interior 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.

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.

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

Overgrazing - Continued heavy grazing that exceeds refuge habitat objectives and the recovery capacity of individual plants in the community and creates a deteriorated range.

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

Palatability - The relish with which a particular species or plant part is consumed by an animal.

Palustrine - Being, living, or thriving in a marsh.

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

Phenology - The study of periodic biological phenomena that is recurrent such as flowering or seeding, especially as related to climate.

Plant community - An assemblage of species or populations of plants growing together 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.

Plant succession - The process of vegetation development whereby an area over time is occupied by different plant communities of later ecological stage.

Plant vigor - Plant health; relates to the relative robustness of a plant in comparison to other individuals of the same species.

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 - Any fire ignited by management actions to meet specific objectives. A written, approved prescribed fire plan must exist, and NEPA requirements (where applicable) must be met, prior to ignition.

Prescribed fire burn plan - A plan required for each fire application ignited by management. Plans are documents prepared by qualified personnel, approved by the agency administrator, and include criteria for the conditions under which the fire will be conducted (a prescription). Plan content varies among the agencies.

Prescribed grazing - Managing the harvest of vegetation with grazing and/or browsing animals (USDA NRCS 2010) (Code 528 of Conservation Practice Standard).

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.

Range condition - The health of range as compared to some standard at a point in time. The standard can be defined in ecological terms or in terms of a particular use. In the ecological determination, the degree of departure from climax determines condition.

Range management - A discipline founded on ecological principles with the objective of sustainable use of rangelands and related resources for various purposes.

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

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.

Residual dry matter (RDM) - The amount of old plant material left on the ground at the beginning of a new growing season.

Rest - Leaving an area ungrazed for a specific time. Rest period. The length of time that a management unit is not grazed.

Rest-rotation - A grazing management scheme in which rest periods, usually for a full growing season, for individuals grazing units are incorporated into a grazing rotation.

Restoration - Rehabilitation of a degraded area that was previously a healthy, functioning, and self-sustaining natural ecosystem.

Riparian zone - The banks and adjacent areas of water bodies, water courses, seeps and springs whose waters provide soil moisture sufficiently in excess of that otherwise available locally so as to provide a moister habitat than that of contiguous flood plains and uplands.

Rotation grazing - A grazing scheme where animals are moved from one grazing unit in the same group of grazing units to another without regard to specific graze: rest periods or levels of plant defoliation.

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.

Seasonal grazing - Grazing only in a portion of the calendar year to achieve habitat management goals. For example, seasonal grazing could prescribe early season grazing, with cattle removed from the area prior to the drying of annual forage (UCIHRMP 1996). (See also year-round grazing and prescribed grazing.)

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

Siltation - The process of becoming covered with silt.

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.

Species composition - The proportions of various plant species in relation to the total on a given area.

Special status species - Special status species include any species which is listed, or proposed for listing, as threatened or endangered by the U.S. Fish and Wildlife Service under the provisions of the Endangered Species Act; any species designated by the Service as a "listed," "candidate," "sensitive" or "species of concern," and any species which is listed by the State in a category implying potential danger of

extinction or any species listed as a California Species of Special Concern (<http://www.dfg.ca.gov/wildlife/nongame/ssc/>). For plants, special status species also include species that have been observed on the refuge and are ranked 1B in the California Native Plant Society's California Rare Plant Rank (<http://www.cnps.org/cnps/rareplants>).

Stocking density - The relationship between the number of animals and the area of land at any given time.

Stocking rate - The number of specific kinds and classes of animals grazing a unit of land for a specified time period.

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.

Targeted grazing - See prescribed grazing.

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.

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.

Year-round grazing - Grazing throughout the entire calendar year. (See also seasonal grazing and prescribed grazing.)

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.

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.

Warm-season plant - A plant that makes most or all its growth during late spring, summer or early fall and is usually dormant in winter.

Weed - (1) a plant growing where unwanted. (2) A plant having a negative value within a given management 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 un-drained hydric soil; and (3) the substrate is non-soil 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 the Service uses 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 we will recommend the area for designation as wilderness.

Wildfire - An unplanned, unwanted wildland fire including unauthorized human-caused fires, escaped wildland fire use events, escaped prescribed fire projects, and all other wildland fires where the objective is to put the fire out. Source: <http://www.nwccg.gov/pms/pubs/glossary/index.htm>

Wildfire suppression - An appropriate management response to wildfire, escaped wildland fire use or prescribed fire that results in curtailment of fire spread and eliminates all identified threats from the particular fire.

Wildland fire - Any non-structure fire that occurs in the wildland. Three distinct types of wildland fire have been defined and include wildfire, wildland fire use, and prescribed fire.

Wildland-Urban Interface (WUI) - The line, area, or zone where structures and other human development meet or intermingle with undeveloped wildland or vegetative fuels.

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.

Wildlife-friendly fence - Wildlife-friendly fences allow native ungulates (such as deer) safe passage over and under the fence. A wildlife-friendly fence has no barbs on the top and bottom wires and other modifications.

Appendix B – Environmental Assessment for the Comprehensive Conservation Plan

U. S. Department of the Interior
Fish and Wildlife Service
Pacific Southwest Region
FINDING OF NO SIGNIFICANT IMPACT
Environmental Assessment of the Comprehensive Conservation Plan
for the Management of Hopper Mountain, Bitter Creek, and Blue Ridge
National Wildlife Refuges
Ventura, Kern, San Luis Obispo, and Tulare Counties, California

The U.S. Fish and Wildlife Service (Service) has completed the Comprehensive Conservation Plan (CCP) and the Environmental Assessment (EA) for **Hopper Mountain, Bitter Creek, and Blue Ridge National Wildlife Refuges** (refuges or NWRs). The CCP will guide the management of the refuges for the next fifteen years. The CCP/EA (USFWS 2013), herein incorporated by reference, describes the Service's proposals for managing the refuges and their associated effects on the human environment under three alternatives, including the no action alternative.

Decision

Following comprehensive review and analysis, the Service selected Alternative B for implementation because it is the alternative that best meets the following criteria:

- Achieves the mission of the National Wildlife Refuge System (Refuge System);
- Achieves the purposes of Hopper Mountain, Bitter Creek, and Blue Ridge NWRs;
- Supports the Service's vision and goals for the refuges;
- Maintains and restores the ecological integrity of the refuges;
- Addresses the key issues identified during the scoping process;
- Addresses the legal mandates of the Service and the refuges;
- Is consistent with the scientific principles of sound fish and wildlife management and endangered species recovery; and
- Facilitates priority public uses, which are compatible with the refuges' purposes and the Refuge System mission.

Alternatives Considered

Following is a brief description of the alternatives for managing the three refuges, including the selected plan (Alternative B). A complete description of each alternative is provided in the EA.

Alternative A (no action)

Under Alternative A, for each of the three refuges, the Service would continue to manage the three refuges as we have in the recent past. There would be continued maintenance of facilities and support of the California Condor Recovery Program activities. The three refuges would remain closed to public use. Alternative A was not selected for implementation because it does not include needed special status species and habitat management, and it does not accommodate the growing demand for wildlife-dependent recreation.

Alternatives for Hopper Mountain NWR

Alternative B (selected plan)

Under Alternative B for Hopper Mountain NWR, the Service would increase condor management and support actions; collect baseline data for refuge resources with emphasis on special status species; improve management of all habitat types on the refuge; and increase outreach and Service-guided visitor and volunteer opportunities. Hopper Mountain NWR would remain closed to public use.

Alternative C

Under Alternative C for Hopper Mountain NWR, the Service would increase some condor management and support actions, expand baseline data collection, manage invasive plants without using pesticides, increase

habitat protection and enhancement of select black walnut and oak woodlands, increase outreach, and consider the feasibility of providing wildlife-dependent recreation on the refuge. The refuge would remain closed to public use. Alternative C was not selected for implementation because it does not optimize condor management and support actions, special status species management, and invasive species management.

Alternatives for Bitter Creek NWR

Alternative B (selected plan)

Under Alternative B for Bitter Creek NWR, the Service would increase condor management and support actions, build a 1,000-square-foot condor treatment facility, and collect baseline data on refuge resources with emphasis on special status species. The Service would also use grazing and other methods to improve habitat quality to support special status San Joaquin Valley wildlife, and restore some springs and drainages. We would also expand visitor services by opening a new interpretive trail, and building a new refuge administrative office with visitor area, and condor observation area.

Alternative C

Under Alternative C for Bitter Creek NWR the Service would improve and expand current management by increasing some condor management and support actions; restore more habitat to support special status species; manage invasive plants without using pesticides; restore more springs and drainages; and expand outreach, interpretation, and visitor and volunteer opportunities. Alternative C was not selected for implementation because it does not optimize condor management and support actions, special status species management, and invasive species management. Alternative C was also not selected because it does not balance the need to improve habitat for special status species with the growing demand for wildlife-dependent recreation on the refuge.

Alternatives for Blue Ridge NWR

Alternative B (selected plan)

Under Alternative B for Blue Ridge NWR, the Service would improve current management by increasing condor management activities, collect baseline data for special status species, and add volunteer opportunities. Portions of the refuge would be opened to public use.

Alternative C

Under Alternative C for Blue Ridge NWR the Service would increase some condor management actions, but to a lesser extent than Alternative B, and work with partners to increase some guided visitor and volunteer opportunities. The refuge would remain closed to public use. Alternative C was not selected for implementation because it does not optimize special status species management and invasive species management. Alternative C was also not selected because it does not balance the need to improve habitat for special status species with the growing demand for wildlife-dependent recreation on the refuge.

Effects of Managing the Refuges on the Human Environment

As analyzed in the EA, implementing the selected alternative (Alternative B) will have no significant impacts on the environmental resources identified in the EA. A summary of the effects analysis and the Service's conclusions follow.

Geology and Soils

Manual removal of invasive plants, construction of condor treatment facilities and visitor services improvements, habitat restoration activities, and increased visitation may result in soil erosion. Soils are not expected to be affected by herbicides because they will be applied in low concentrations with low half-lives and be approved for use under the Service's Pesticide Use Proposal program. Nonnative vegetation will be replaced with native plantings as needed to avoid long-term erosion. Erosion from new facility construction will be minimized by choosing sites, as much as possible, in poor quality habitat areas that have already been disturbed by past ranching and residential uses. The Best Management Practices (mitigation measures

identified in Appendix 1 to the EA) and our Pesticide Use Proposal program will be used during implementation of the CCP. Therefore, the Service has concluded that implementation of the CCP will have no significant impact on geologic resources and soils.

Air Quality

Activities such as invasive plant management, construction of condor treatment and visitor services improvements, habitat restoration activities, and pile burning are expected to minimally increase air particulates in the immediate area, primarily from increased dust and tailpipe emission from heavy equipment operation during construction. Dust generated from management activities will be minimized with soil stabilization techniques such as dampening the soil. Increased visitation would result in minor increases in tailpipe emissions in the area. However, it is reasonable to assume that an increase in visitation to the refuges may reflect visitors' choosing a refuge as their destination rather than another location offering similar opportunities. Because the effects are localized in small areas, of short duration, temporary or infrequent, and the Best Management Practices listed in Appendix 1 will be implemented, the Service has concluded that implementation of the CCP will have no significant impact on air quality.

Climate Change – Greenhouse Gas Emissions

There are no federal requirements mandating that climate change impacts be analyzed in NEPA documents. To date, the agencies with jurisdiction over air quality regulation and greenhouse gas (GHG) emissions have not established regulations, methodologies, significance thresholds, standards, or analysis protocols for the assessment of GHG emissions and climate change. Although GHG emissions would increase with CCP implementation, the increase is expected to be minor compared to existing conditions.

Based on the use of products and procedures that result in the production of qualitatively fewer GHG emissions than conventional methods, the Service has concluded that implementation of the CCP will have no significant impact on GHG emissions in the area. Effects to air quality are discussed above.

Noise

Implementation of the CCP would have minor increases in noise from increased vehicle and equipment access through rural residential areas. These minor increases will be short-term and/or intermittent and will not significantly affect sensitive receptors.

Water

Implementation of the CCP could have minor short-term negative effects from increased erosion. The Best Management Practices and our Pesticide Use Proposal program will be used to minimize adverse effects to water resources. Implementation of the CCP will also have positive effects on hydrology and water quality following riparian habitat restoration and modification of water control structures to restore natural flows of water. Accordingly, the Service has concluded that implementation of the CCP will have no significant impact on water quality.

Vegetation

The selected plan will help maintain and restore the biological integrity, diversity, and environmental health of the refuges' plant communities. Measures to reduce and control invasive plants that have the potential to disperse beyond the refuges' boundaries will have a beneficial effect on native plant communities on the refuges and the surrounding areas. The use of herbicides to control exotic plant pests will be conducted in accordance with our Pesticide Use Proposal program to avoid adverse effects to non-target plants. Re-planting select areas with native plants will result in restoration of native habitat. Service-led tours may result in disturbance of some vegetated areas. Tours will be confined to existing roads and previously disturbed sites and will avoid sensitive areas and seasons. Disturbance and destruction of existing vegetation from the construction of condor facilities and visitor services improvements (contact station, kiosks, signs, trails and parking area) will be minimized by choosing sites, as much as possible, in poor quality habitat areas that have already been disturbed by past ranching and residential uses. The Best Management Practices and our

Pesticide Use Proposal program will be used to minimize impacts to vegetation. The Service has concluded that implementation of the CCP will have no significant impact on vegetation.

Wildlife Resources

The Service expects that vegetation management will improve the quality of wildlife habitat, benefiting wildlife populations in the long-term. Short-term disturbances to wildlife will occur during monitoring and surveys. Inventory and monitoring protocols will be reviewed by refuges' staff to ensure that disturbances are minimized and that Best Management Practices are implemented. Restoration and management activities (e.g., grazing, chemical and mechanical invasive vegetation control and native plantings) may cause temporary disturbance to wildlife and may temporarily flush wildlife while work is being done. Best Management Practices will be used to minimize impacts and disturbance to wildlife and habitat during the construction of visitor services improvements (contact station, kiosks, signs, trails and parking areas). The increase in visitor use due to the expanded visitor services and environmental education programs may result in flushing wildlife from the areas of use. Additional signage and fencing may be used to deter visitors from entering sensitive habitat. To avoid adverse effects, areas that are known to have sensitive species would remain closed to public use or may have restricted public access to protect species during critical lifecycle periods. Although there may be short-term, temporary disturbance to a small number of individual animals, the Service anticipates that implementation of the CCP will have long-term beneficial effects to wildlife populations. The Best Management Practices and our Pesticide Use Proposal program will be used during implementation of the CCP to minimize impacts to wildlife resources. The Service has concluded that implementation of the CCP will have no significant impact on fish and wildlife.

Special Status Species

In compliance with section 7 of the Endangered Species Act, the Service determined the effects of implementing the CCP on the species indicated as follows for each of the three refuges.

Hopper Mountain NWR –

We have determination that the proposed action may affect, but is not likely to adversely affect the federally-listed as endangered California condor (*Gymnogyps californianus*), least Bell's vireo (*Vireo bellii pusillus*) and southwestern willow flycatcher (*Empidonax traillii extimus*), and the threatened coastal California gnatcatcher (*Polioptila californica californica*) and California red-legged frog (*Rana draytonii*).

Bitter Creek NWR –

We have determined that the proposed action will have no effect on the endangered Buena vista Lake shrew (*Sorex ornatus relictus*); and may affect, but is not likely to adversely affect the endangered California condor, giant kangaroo rat (*Dipodomys ingens*), San Joaquin kit fox (*Vulpes macrotis mutica*), blunt-nosed leopard lizard (*Gambelia sila*), California jewelflower (*Caulanthus californicus*), Kern mallow (*Eremalche kernensis*), and San Joaquin woollythreads (*Monolopia congdonii*); and the threatened California red-legged frog (*Rana draytonii*), vernal pool fairy shrimp (*Branchinecta lynchi*), valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), and Kern primrose sphinx moth (*Euproserpinus euterpe*).

Blue Ridge NWR –

We have determined that the proposed action will have no effect on the threatened Delta smelt (*Hypomesus transpacificus*) and the proposed endangered mountain yellow-legged frog (*Rana muscosa*) northern California Distinct Population Segment; will not jeopardize the continued existence of the candidate fisher (*Martes pennanti*); and may affect, but is not likely to adversely affect the endangered California condor and California condor critical habitat; and the threatened California red-legged frog, valley elderberry longhorn beetle, and Springville clarkia (*Clarkia springvillensis*).

Implementing the CCP is expected to benefit special status species locally and regionally. To avoid adverse effects, areas that are known to have sensitive species would remain closed to public use or may have restricted public access to protect species during critical lifecycle periods. Best Management Practices are incorporated into the selected plan (CCP). The Service would implement several Best Management Practices

to mitigate potentially adverse effects to special status species by CCP activities: 1) using an adaptive management approach, trails, roads, and/or areas would be closed to ensure that human access does not disturb special status species; and 2) prior to habitat and ground disturbing activities, potential habitat for special status species would be evaluated and, if appropriate, presence/absence surveys and additional mitigation measures would be implemented (e.g., avoid location, change timing of action), as necessary to ensure that planned activities do not disturb special status species (USFWS 2013).

Some short-term and long-term beneficial effects to special status species are expected to occur. We define a substantial effect as one that affects the population of a species as a whole, not individual animals. While the activities analyzed in the EA may adversely affect a small number of individual animals as they are being implemented, this potential effect (the issue of “take” under ESA) is addressed and conditioned within the consultation pursuant to section 7 of the ESA, as identified in the Final CCP/EA and appendices. There will be no substantial adverse effects to populations of special status species.

In summary, though CCP implementation may result in limited adverse effects to individuals of these species, adverse effects on their populations are not anticipated. Based on the implementation of the Best Management Practices and our Pesticide Use Proposal program, the Service has concluded that implementation of the CCP will have no significant impact on special status species and their habitat at Hopper Mountain, Bitter Creek, and Blue Ridge NWRs.

Socioeconomics

The selected plan increases wildlife-dependent recreational opportunities for the public on Bitter Creek and Blue Ridge NWRs, which may increase the number of visits to the refuges. If an increase in visits to the refuges occurs, this may benefit the local economy and local employment if visitors utilize local businesses. Additionally, increased visitation provides an opportunity for public education, which can foster the value of public stewardship for conservation lands. Increasing opportunities for public use of the refuges are expected to have a beneficial effect on the local communities’ social and economic environment.

Public Use

The selected plan includes opening portions of Bitter Creek and Blue Ridge NWR to public use. Public access will be provided in locations where compatible with wildlife. Visitor services improvements would be built and wildlife-dependent recreation would increase on the Bitter Creek and Blue Ridge NWRs. The Service strives to provide an optimal balance of wildlife resources benefits and visitor services. The overall increase in wildlife-dependent recreational opportunities is not expected to have significant effects on refuge resources, as described above, by resource. The expansion of the visitor services program will lead to increased awareness and appreciation of the refuges’ plant and wildlife resources and is expected to have a beneficial effect on the local communities.

Cultural Resources

Under federal ownership, archaeological and historical resources within a refuge receive protection under federal laws mandating the management of cultural resources. The Service would continue to manage and conserve cultural resources at the refuges and exercise section 106 of the National Historic Preservation Act. As each of the management activities in the CCP are implemented, the area of potential effect will be defined and if effects on historic properties are likely, the section 106 process will be completed prior to initiation of the activity. Minor impacts to cultural resources may occur if they are discovered incidentally during ground-disturbing habitat restoration or installation of visitor services improvements (new administrative office with visitor area, condor observation area, kiosks, signs, and parking areas). All sites discovered in the future would be treated as eligible for listing on the National Register of Historic Places until listed or formally evaluated as ineligible in consultation with the State Historic Preservation Officer. There is no documentation of human remains at Hopper Mountain, Bitter Creek, or Blue Ridge NWRs. The Service will comply with the Native American Graves Protection and Repatriation Act of 1990 consultation process and other applicable laws and guidance required for consideration of human remains and other items addressed

under the act. Therefore, the Service has concluded that implementation of the CCP will have no significant impact on cultural resources at the refuges.

Environmental Justice

The Service has concluded that no Native residents, minority and low-income populations or communities would be disproportionately affected by implementing the selected plan. Further, no adverse human health effects would result from the actions in the CCP.

Indian Trust Assets

The Service shares the responsibility with all other agencies of the Executive Branch to protect and maintain Indian Trust Assets reserved by or granted to Indian tribes, or Indian individuals by treaty, statute, or Executive Order. There are no known tribes possessing legal property interests held in trust by the United States on the refuge lands or natural resources related to the selected plan. As a result, implementation of the CCP will have no significant impact on Indian Trust Assets.

Public Review

The planning process incorporated the following public involvement in developing and reviewing the CCP. Public outreach included five planning updates (newsletters), and public review and comment on the planning documents. The Draft CCP/EA was available for public review and comment for a 60-day period from April 11 through June 11, 2012. The document was distributed to federal, state, and local agencies; public libraries; potentially affected landowners; private groups, and individuals. The Service received a total of 25 letters from state and local agencies, organizations and individuals, containing over 750 comments. The Final CCP/EA has been modified to address many of the concerns that were raised. The Service's responses to specific comments received are included in Appendix K to the Final CCP/EA. The details of the Service's public involvement program are described in the Final CCP/EA.

Conclusions

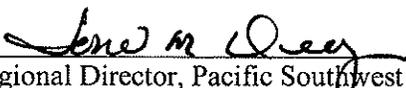
Based on review and evaluation of the information contained in the supporting references (see below), I have determined that implementing Alternative B of the EA for management of Hopper Mountain, Bitter Creek, and Blue Ridge NWRs is not a major federal action that would significantly affect the quality of the human environment, within the meaning of section 102(2) (c) of the National Environmental Policy Act of 1969, as amended. Accordingly, the Service is not required to prepare an environmental impact statement. Implementation of Alternative B will be subject to the availability of funding and other resources, and may occur incrementally over the life of the 15-year plan.

This Finding of No Significant Impact and supporting references are on file at the U.S. Fish and Wildlife Service, Pacific Southwest Region, 2800 Cottage Way, W-1832, Sacramento, California, 95825 (phone 916-414-6500). These documents are available to the public and can be found online at <http://www.fws.gov/hoppermountain/>. The Service will place public notices in a local newspaper and send a final planning update to interested and affected parties notifying them of this decision.

Supporting References

U.S. Fish and Wildlife Service. 2013. Final Comprehensive Conservation Plan and Environmental Assessment for the Hopper Mountain, Bitter Creek, and Blue Ridge National Wildlife Refuges. Pacific Southwest Region. Sacramento, CA.

Acting


Regional Director, Pacific Southwest Region
Sacramento, California

9/30/13
Date

**Appendix B –
Final Environmental Assessment
for
Hopper Mountain,
Bitter Creek, and Blue Ridge
National Wildlife Refuges
Comprehensive Conservation Plan**

Prepared By:

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June 2013

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Final Environmental Assessment for Hopper Mountain, Bitter Creek, and Blue Ridge National Wildlife Refuges Comprehensive Conservation Plan

Chapter 1. Purpose and Need for Action

Introduction

The environmental assessment (EA) evaluates the environmental effects of 3 alternatives for managing the Hopper Mountain, Bitter Creek, and Blue Ridge National Wildlife Refuges (NWRs). The U.S. Fish and Wildlife Service (Service) used this EA to solicit public involvement in the refuge planning process and to determine whether implementation of the Comprehensive Conservation Plan (CCP) would 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 B as the Comprehensive Conservation Plan for Hopper Mountain, Bitter Creek, and Blue Ridge NWRs, as described in this EA. Specific details regarding the preferred alternative and the other alternatives are provided in Chapter 2 of this EA. The preferred alternative is described in more detail in the accompanying CCP.

The final decision can be any of the alternatives and may reflect a modification of certain elements of any alternative based on consideration of public comment.

Purpose of and Need for the Comprehensive Conservation Plan and EA

The development of a 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 refuge was established, the mandates of the Refuge System, and the refuges' goals and objectives. The purpose of this CCP is to describe the desired future conditions of Hopper Mountain, Bitter Creek, and Blue Ridge NWRs during over the next 15 years and provide guidance for achieving those conditions. The CCP:

- Sets a long term vision for the refuge;
- Establishes management goals, objectives, and strategies for the refuge;
- Provides the refuge 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 refuge to the public; and
- Provides a basis for budget needs to support staffing, operations, maintenance, and capital improvements.

The development of this 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 (Refuge Improvement Act), requires that every refuge or related complex of refuges have a CCP in place within 15 years of the Refuge Improvement Act's enactment. The NEPA requires that an EA or environmental impact statement be prepared to accompany the CCP to evaluate the effects of different alternatives which meet the goals of the refuges and identifies the Service's proposed action for implementing the CCP.

Project Area

Hopper Mountain NWR

Hopper Mountain NWR is in Ventura County, approximately 6 miles north of the community of Fillmore. This refuge was established in 1974 to protect the endangered California condor, its habitat, and other wildlife resources. Hopper Mountain NWR encompasses 2,471 contiguous acres.

Bitter Creek NWR

Bitter Creek NWR is located approximately 80 miles north of Los Angeles and approximately 10 miles southwest of the community of Maricopa in the foothills of the San Joaquin Valley. The approved acquisition boundary includes lands in portions of Kern, Ventura, and San Luis Obispo counties. Bitter Creek NWR is situated in the northern reaches of the Transverse Range, an ecologically diverse area where the Coast Range, Sierra Nevada Mountains, western Mojave Desert, and San Joaquin Valley converge. This refuge was established in 1985 to provide safe roosting and foraging habitat for California condors and to protect other endangered species. Bitter Creek NWR encompasses 14,097 acres.

Blue Ridge NWR

Blue Ridge NWR is located in central Tulare County in the foothills of the Sierra Nevada Mountains, 11 miles north of Springville and 17.5 miles northeast of Porterville, California. Blue Ridge NWR was established in 1982 to protect critical habitat for the endangered California condor. Blue Ridge NWR encompasses 897 acres.

Decisions to be Made

Based on the analysis documented in the EA, the regional director must determine the type and extent of management and visitor access that will occur on the refuges and whether the selected management alternative would have a significant effect on the quality of the human environment. If no significant impacts on the human environment are identified, a Finding of No Significant Impact (FONSI) document will be prepared.

Issue Identification

The Service identified issues, concerns, and opportunities through early planning discussions and the public scoping process. The core planning team includes Service employees from the Hopper Mountain, Bitter Creek, and Blue Ridge NWRs, Hopper Mountain National Wildlife Refuge Complex, and Refuge Planning for the Pacific Southwest Region.

In February 2010, the first Planning Update, introducing the refuges and the CCP process, was mailed to over 200 members of the public, elected officials, organizations, media, and agency representatives. In April 2010, a Planning Update was distributed to interested stakeholders that had been identified through prior planning processes. 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.

On April 6, 2010, a Notice of Intent (NOI) to prepare a CCP/EA was published in the Federal Register. During the spring of 2010, public scoping meetings were conducted, news releases circulated, website information posted, and informational mailings sent to interested parties to gather input and comments. The public had opportunities to attend 3 public scoping meetings: one meeting in Fillmore (on April 20, 2010), one meeting in Taft (on April 28, 2010), and one in Porterville (on May 5, 2010). Approximately

71 people attended the Taft meeting, 1 person attended the Porterville meeting, and none attended the Fillmore meeting. Prior to public scoping meetings, the Refuge Complex issued a press release to many local media outlets such as local newspapers, newsletters, and blogs. For a list of media outlets contacted, see Chapter 2 of the CCP.

The planning team has helped further define the issues and challenges and incorporated into the CCP and EA the public input received in response to the updates and public outreach.

Service staff also reviewed the comments that were received in 2008, during the public comment period on the 2008 Environmental Assessment and Compatibility Determination for the Bitter Creek National Wildlife Refuge Proposed Habitat Management and Restoration Plan (2008 Bitter Creek NWR Habitat Management EA). Comments on the 2008 Bitter Creek NWR Habitat Management EA have been incorporated into the CCP scoping process and are represented in the Scoping Summary Report (Appendix K).

Highlights of the issues and challenges raised during scoping are included in Chapter 2 of the CCP, and a scoping summary report for the CCP/EA is included in Appendix K. Please refer to Chapter 2 of the CCP for a detailed summary of the planning process and issues used in developing the plan. The issues can be grouped into the following categories.

- Administration and operation
- Climate change
- Cultural resources
- Environmental education
- Fire management
- General CCP framework
- Habitat management
- Other land management issues
- Public involvement
- Wildlife management
- Wildlife-dependent recreation

Refuge Purposes and Authority

The purposes identified here are defined by language within acts of Congress, which grant the Service general authority to acquire lands for National Wildlife Refuges. The purpose for Hopper Mountain, Bitter Creek, and Blue Ridge NWRs is:

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

An additional purpose for acquiring lands for Hopper Mountain NWR is:

"... for the development, advancement, management, conservation, and protection of fish and wildlife resources ... 16 U.S.C. Sec 742f(a)(4) "... for the benefit of the United States Fish and Wildlife Service, in performing its activities and services. Such acceptance may be subject to the terms of any restrictive or affirmative covenant, or condition of servitude ..." 16 U.S.C. Sec 742f(b)(1) (Fish and Wildlife Act of 1956).

Refuge Vision

Please see Chapter 1 of the CCP for the refuges' vision statements.

Refuge Goals

Goals are proposed for each refuge and outlined in detail in the CCP. Some goals are habitat specific goals, and others are operations oriented.

Hopper Mountain NWR Goals

GOAL 1 - California Condor (*Gymnogyps californianus*) Recovery Program: Support the recovery strategies of the California Condor Recovery Program on Hopper Mountain NWR.

GOAL 2 - Grasslands: Protect and enhance refuge grasslands for healthy ecological conditions to support an abundance and diversity of migratory birds and special status species.

GOAL 3 - Riparian and wetland: Enhance and maintain optimum health and function of the riparian and wetland areas to support a diversity of Neotropical migratory birds and special status species.

GOAL 4 – Southern California black walnut and oak woodlands: Restore and perpetuate native black walnut (*Juglans californica* var. *californica*) and oak woodlands to support Neotropical migratory birds and special status species.

GOAL 5 - Coastal sage scrub: Maintain and restore coastal sage scrub to support coastal sage scrub-associated special status and priority species.

GOAL 6 - Environmental education and interpretation: Provide quality information and education to increase the public's appreciation and understanding of the California Condor Recovery Program, as well as Hopper Mountain NWR and its wildlife, habitats, and cultural resources.

Bitter Creek NWR Goals

GOAL 1 - California Condor Recovery Program: Support the recovery strategies of the California Condor Recovery Program on Bitter Creek NWR.

GOAL 2 - Grasslands: Protect and enhance Bitter Creek NWR grasslands to promote ecologically sound conditions to support a diversity of migratory birds and plant and animal special status species.

GOAL 3 - Oak woodlands: Protect and enhance oak and other refuge woodlands for healthy ecological conditions to support special status species and an abundance and diversity of migratory birds.

GOAL 4 - Riparian and wetland: Restore and maintain riparian and wetland communities to support native plants and wildlife.

GOAL 5 - Landscape-level connectivity: Promote ecosystem function by enhancing landscape-level connectivity within the Transverse Ranges through coordinated management.

GOAL 6 - Environmental education and interpretation: Provide quality information and education to increase the public's appreciation and understanding of the refuge and its wildlife, habitats, and cultural resources.

Blue Ridge NWR Goals

GOAL 1 - California Condor Recovery Program: Support the recovery strategies of the California Condor Recovery Program on Blue Ridge NWR.

GOAL 2 - Sierra foothill communities: Maintain healthy and representative examples of Sierra foothill communities, such as coniferous forests, woodland savannas, and chaparral.

GOAL 3 - Environmental education and interpretation: Provide quality interpretive and wildlife-dependent recreational opportunities for refuge visitors and the community to promote a deeper understanding and appreciation of the refuge and the California condor.

Chapter 2. Alternatives, Including the Proposed Action

Introduction

This chapter describes 3 alternatives for managing the Hopper Mountain, Bitter Creek, and Blue Ridge NWRs: Alternative A (No Action), Alternative B, and Alternative C. These alternatives are described in the following text. Under Alternative A, the No Action alternative, the Service would continue managing

the refuge as it currently does. Alternatives B and C presented in this chapter are “action alternatives” that would involve a change in the current management of the refuge. The Service’s preferred alternative or proposed action is Alternative B.

Management Actions Considered but Eliminated from Detailed Analysis as Part of the Alternatives

During the public scoping period, some alternative actions for managing the refuge were suggested. Some of these suggestions were consistent with refuge purposes and the mission of the Refuge System and influenced the action alternatives. Other 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. The actions that were removed from further consideration and the rationale for removal are as follows.

Prescribed fire for habitat management

During the 2010 CCP/EA scoping meetings, fire management generated conflicting opinions. Various organizations acknowledged that prescribed burning may play a role in restoring the health of grassland/oak woodland communities within the Refuge Complex. There was significant disagreement about the need for, frequency of, and impacts of prescribed burns at Bitter Creek NWR. Respondents recommended prescribed burning only be used if, based on the best available science, it is determined to be appropriate and necessary to restore a historic fire regime or to restore native habitat. The majority of comments received during the scoping meetings, and comments on the 2008 EA for habitat management, regarding fire management were strongly opposed to “prescribed burns” at Bitter Creek NWR for habitat management purposes. The most common concern raised was that prescribed burns would have a negative impact on air quality and result in adverse health effects for Kern County residents.

The approved update to the Fire Management Plan (FMP) for Bitter Creek NWR allows prescribed burning in the form of pile burning (USFWS 2009). As described in this CCP, prescribed burning will continue to be limited to pile burning until the appropriate role and feasibility of using fire on the refuge are determined and the CCP and FMP are amended. All prescribed burning, including pile burning, requires an approved burn plan. Pile burning is used primarily in winter, when air quality is less likely to be adversely affected. The Service obtains the required permits to burn from the regional air quality district. At Bitter Creek NWR, prescribed fire for habitat management purposes is not a part of the alternative CCP actions and is not carried forward for detailed analysis. At Hopper Mountain NWR and Blue Ridge NWR, the use of prescribed fire for habitat management is analyzed in this EA.

Management Actions not Analyzed as Part of the Alternatives

Actions related to the California Condor Recovery Program (Recovery Program) are funded and conducted separately in coordination with refuge operations and management activities. Recovery Program activities are not analyzed as part of the CCP alternatives. A description of the activities of the Recovery Program can be found in the April 1996 Recovery Plan for the California Condor (USFWS 1996).

Current Management of Hopper Mountain, Bitter Creek, and Blue Ridge NWRs

For a complete description of the current management practices, please see Chapters 1 and 3 of the CCP.

Ongoing Projects

A hydro-geomorphic evaluation of Bitter Creek NWR was initiated during preparation of the Draft CCP and described in the Draft EA. The evaluation was not completed and the Service terminated the evaluation in 2012 for contractual reasons.

Description of Alternatives

Alternative A (No Action Alternative) - Hopper Mountain, Bitter Creek and Blue Ridge NWRs:

Under Alternative A, the Service would continue to manage the refuges as in the recent past. Existing staffing and funding levels would remain approximately the same. Alternative A includes the following.

Alternative A - Continue to manage the refuges as in the recent past (see Chapters 1 and 3 of the CCP), supporting the goals of the California Condor Recovery Program (Recovery Program) to maximize condor survivorship, maintaining Hopper Mountain and Bitter Creek NWRs as condor release sites for the Recovery Program, providing on-refuge temporary housing on Hopper Mountain and Bitter Creek NWRs to support the Recovery Program and academic research, and protecting condor roosting, nesting, and/or foraging habitat on the 3 refuges. Continue full suppression of all wildfires using appropriate management response. No major changes in habitat management would occur. The refuges would remain closed to public use.

Hopper Mountain NWR Alternatives

Table 2-1. Hopper Mountain NWR: Summary of Alternatives

Issue Area	Alternative A: No Action (Maintain Current Management)	Alternative B: Preferred	Alternative C
GOAL 1: Support the recovery strategies of the California Condor Recovery Program on Hopper Mountain NWR*			
California condor (<i>Gymnogyps californianus</i>) (FE) Recovery Program – condor survivorship	<ul style="list-style-type: none"> • Provide and maintain flight pen and condor treatment facility for assessment, treatment and transmitter maintenance 	<ul style="list-style-type: none"> • Alternative A, plus replace historic-era equipment barn near house headquarters with new 1,600-sf pole barn • Maintain at least 2 condor trap sites to support Recovery Program activities • Expand remote population monitoring capabilities (e.g., GPS, remote telemetry stations on-refuge) 	<ul style="list-style-type: none"> • Alternative A, plus increase volunteer condor monitoring activities (on-refuge)
California condor Recovery Program – release site	<ul style="list-style-type: none"> • Maintain flight pen for condor pre-release and releases • Maintain feeding sites for newly released condors • Reduce fuels near facilities (mowing) and conduct fire suppression to protect life and facilities from wildland fires • Maintain access trails to support condor management activities • Maintain disturbance free-environment 	<ul style="list-style-type: none"> • Alternative A, plus coordinate with ranchers to allow condors to feed on natural livestock mortalities and with hunters about leaving non-lead carcasses or gut piles in the field 	<ul style="list-style-type: none"> • Same as Alternative A

Issue Area	Alternative A: No Action (Maintain Current Management)	Alternative B: Preferred	Alternative C
California condor Recovery Program – activity support	<ul style="list-style-type: none"> Maintain existing housing and other facilities for use by Service staff, volunteers, and partners (up to 8 persons total) 	<ul style="list-style-type: none"> A, plus by 2020, replace unusable housing (old trailers) with Service-approved living quarters to increase capacity by up to 8 more persons (up to 16 persons total) Optimize energy efficiency of new facilities by following “green” LEED building standards 	<ul style="list-style-type: none"> Alternative A, plus replace obsolete housing (old trailers) with Service-approved living quarters to increase capacity by up to 8 more persons (up to 16 persons total) Add 2 RV hookups to increase housing capacity by up to 4 more persons (up to 20 persons total)
California condor Recovery Program – roosting habitat	<ul style="list-style-type: none"> Minimize human disturbance near condor roosting areas 	<ul style="list-style-type: none"> Alternative A, plus survey and map existing and historical roost sites on-refuge Evaluate and monitor threats to roost sites (e.g., fire, insect) Coordinate with U.S. Forest Service and others leading assessment of effects of climate change to identify potential effects to resources including roosting habitat Support research and modeling of future impact of climate change on refuge habitats 	<ul style="list-style-type: none"> Same as Alternative A
California condor Recovery Program – nesting habitat	<ul style="list-style-type: none"> Minimize disturbance (condor nesting habitat closed to public) Provide support for Recovery Program’s nest management activities 	<ul style="list-style-type: none"> Same as Alternative A 	<ul style="list-style-type: none"> Same as Alternative A
Carbon emissions	<ul style="list-style-type: none"> No actions 	<ul style="list-style-type: none"> Develop and use measures to reduce emissions from refuge operations Implement measures to improve efficiency both at refuge and Refuge Complex Headquarters Educate and empower refuge staff and volunteers about green activities that offset/reduce carbon emissions, climate change, and its effects on refuge resources 	<ul style="list-style-type: none"> Same as Alternative A
GOAL 2: Protect and enhance refuge grasslands for healthy ecological conditions to support abundance and diversity of migratory birds and special status species*			
Grassland mosaic to benefit grassland-obligate birds	<ul style="list-style-type: none"> No actions 	<ul style="list-style-type: none"> Develop and implement step-down grassland Habitat Management Plan to maintain a mosaic of habitats suitable for special status species. 	<ul style="list-style-type: none"> Same as Alternative B

Issue Area	Alternative A: No Action (Maintain Current Management)	Alternative B: Preferred	Alternative C
		Consider grazing (e.g., sheep, cattle) and prescribed fire to reduce fuel loads and manage habitat <ul style="list-style-type: none"> • Develop a long-term grassland restoration strategy that includes climate change adaptation, as part of grassland Habitat Management Plan • Implement survey protocols to document grass heights, densities, and composition • Develop, implement IPM Plan • Reduce non-native and invasive species composition in existing grasslands using IPM techniques including targeted grazing, chemical, prescribed fire, and/or mechanical treatments • Coordinate with neighboring landowners and county governments on weed management best practices • Implement an early detection/rapid response as part of a step-down IPM Plan 	
Baseline information on grasslands	<ul style="list-style-type: none"> • No actions 	<ul style="list-style-type: none"> • Map current approximate distribution of native grasses and forbs on the refuge • Conduct surveys for select special status wildlife • Develop partnerships with agencies, NGOs, and universities for research supporting refuge goals 	<ul style="list-style-type: none"> • Same as Alternative B
Grassland non-native invasive species	<ul style="list-style-type: none"> • No actions 	<ul style="list-style-type: none"> • Develop step-down IPM Plan including early detection/rapid response of invasive wildlife (including feral swine) • Within 5 years, inventory and map existing and potential invasive plants and animals • Limit invasion and spread of colonizing non-native plants using IPM techniques • Support research to control invasive plants 	<ul style="list-style-type: none"> • Alternative B, plus conduct, facilitate, and/or support research to identify invasive plant biology and ecology and to evaluate techniques for controlling invasive plant species • No chemicals (i.e., without pesticides)
GOAL 3: Enhance and maintain optimum health and function of the riparian and wetland areas to support a diversity of Neotropical migratory birds and special status species*			
Wetland and riparian resources and associated plant and animal communities	<ul style="list-style-type: none"> • Partial inventory of existing springs 	<ul style="list-style-type: none"> • Conduct targeted wetland/riparian plant and animal surveys for special status species such as 	<ul style="list-style-type: none"> • Alternative B, plus monitor water quality and quantity • Conduct

Issue Area	Alternative A: No Action (Maintain Current Management)	Alternative B: Preferred	Alternative C
		California red-legged frog (<i>Rana draytonii</i>) (FT) <ul style="list-style-type: none"> • Conduct point count surveys for birds in wetland/riparian areas • Develop partnerships with others to pursue research that supports refuge goals for wetland/riparian communities, species and water sources • Develop and implement survey protocols for riparian/wetland resources 	comprehensive wetland/riparian plant and animal surveys
Riparian and wetland invasive species	<ul style="list-style-type: none"> • No actions 	<ul style="list-style-type: none"> • Develop and implement IPM Plan for invasive non-native species • Implement early detection/rapid response as part of IPM Plan • Plant native trees and understory using local ecotypes 	<ul style="list-style-type: none"> • Same as Alternative B, but without chemicals (i.e., without pesticides)
Springs, wetlands, and water rights	<ul style="list-style-type: none"> • No actions 	<ul style="list-style-type: none"> • Conduct comprehensive inventory of existing water rights and springs • Conduct water quality testing during regular flows and after storm events • Coordinate with upstream oil and gas operators to inform them of potentially adverse effects to riparian and water resources related to contaminants and runoff and encourage oil and gas operators' voluntary use of BMPs to protect refuge resources • Monitor annually and protect riparian/wetland from degradation and runoff erosion, head-cutting by installing water-bars or culverts as needed • Maintain refuge roads to decrease associated erosion 	<ul style="list-style-type: none"> • Same as Alternative A
Existing man-made wetland	<ul style="list-style-type: none"> • Monitor wetland for reed canarygrass (<i>Phalaris arundinacea</i>) 	<ul style="list-style-type: none"> • Alternative A, plus develop and implement step-down Habitat Management Plan that includes riparian and wetland areas and climate change adaptation • Replace existing culvert with new water control structure (i.e., weir and weir boards) and 	<ul style="list-style-type: none"> • Same as Alternative A

Issue Area	Alternative A: No Action (Maintain Current Management)	Alternative B: Preferred	Alternative C
		manipulate water levels guided by adaptive management <ul style="list-style-type: none"> • Mechanically modify wetland substrate to achieve objective ratios of 50% emergent and 50% open water • Adaptively manage vegetation to benefit riparian associated birds and California red-legged frog (FT) • Sustain and encourage growth of hemp dogbane at the man-made wetland 	
GOAL 4: Restore and perpetuate native black walnut (<i>Juglans californica</i> var. <i>californica</i>) and oak woodlands to support Neotropical migratory birds and special status species*			
Black walnut (<i>Juglans californica</i>) and oak woodlands to benefit woodland birds including Nuttall's woodpecker (<i>Picoides nuttallii</i>) and acorn woodpecker (<i>Melanerpes formicivorus</i>), oak titmouse (<i>Baeolophus inornatus</i>), Hutton's vireo (<i>Vireo huttoni</i>), and ash-throated flycatcher (<i>Myiarchus cinerascens</i>)	<ul style="list-style-type: none"> • Maintain fire breaks and fuels reduction near roads and facilities • Maintain coordination for fire protection with other agencies 	<ul style="list-style-type: none"> • Alternative A, plus develop and implement a S CA black walnut (<i>Juglans californica</i>) and oak Habitat Management Plan that includes climate change adaptation • Reduce fuel loads in grasslands using targeted grassland management tools (e.g., grazing, mowing, prescribed burns) • Every 5 years, work w/ a biologist to evaluate health, vigor and recruitment of black walnut and oak woodlands • If needed, consider browse protection for young oaks and walnuts per Habitat Management Plan • Develop monitoring to determine wildlife use of walnut and oak stands and compile a species list 	<ul style="list-style-type: none"> • Alternative A, plus create additional fuel breaks around select walnut stands • Alternative B, plus promote regeneration, including seed collection and banking • Use targeted grazing to reduce weeds and annual invasive grasses that compete with walnut and oak seedling
GOAL 5: Maintain and restore coastal sage scrub to support coastal sage scrub-associated special status and priority species			
Coastal sage scrub	<ul style="list-style-type: none"> • No actions 	<ul style="list-style-type: none"> • Conduct surveys for coastal California gnatcatcher on the refuge • Conduct surveys for coastal sage scrub special status species on the refuge 	<ul style="list-style-type: none"> • Same as Alternative B
	<ul style="list-style-type: none"> • No actions 	<ul style="list-style-type: none"> • Use Partners in Flight (PIF) Bird Conservation Plan to develop habitat management recommendations to benefit PIF priority birds 	<ul style="list-style-type: none"> • Same as Alternative B

GOAL 6: Provide quality information and education to increase the public's appreciation and understanding of the California Condor Recovery Program, as well as Hopper Mountain NWR and its wildlife, habitats, and cultural resources			
Visitor use	<ul style="list-style-type: none"> • Conduct limited number of guided tours • Work with Friends of California Condors Wild and Free to offer joint walks and talks • Refuge closed to public use 	<ul style="list-style-type: none"> • Alternative A, plus regularly scheduled seasonal refuge tours • Coordinate with U.S. Forest Service to provide interpretation on California condors • Refuge closed to public use 	<ul style="list-style-type: none"> • Alternative A, plus study options for refuge visitor public access (i.e., oil access roads, Angel's Pass) • Determine feasibility of wildlife-dependent recreation • Refuge closed to public use
Volunteer opportunities	<ul style="list-style-type: none"> • Limited number of volunteer projects on refuge • Partner with the Friends of California Condors Wild and Free on volunteer opportunities • Volunteer field biologists 	<ul style="list-style-type: none"> • Alternative A, plus offer at least 2 volunteer opportunities per year • Provide volunteer opportunities, such as plant propagation, planting, invasive plant removal, plant and wildlife surveys 	<ul style="list-style-type: none"> • Alternative B, plus work with Friends of California Condors Wild and Free and other organizations to offer joint walks, talks, and volunteer opportunities
Safety and law enforcement	<ul style="list-style-type: none"> • Periodic patrols by law enforcement (refuge closed to public use) • Refuge boundary partially signed • Periodic coordination with neighboring agencies on law enforcement 	<ul style="list-style-type: none"> • Complete posting of entire boundary • Maintain fuel breaks (mowing/existing roads serve as fuel breaks) 	<ul style="list-style-type: none"> • Same as Alternative B

*The actions will be in accordance with and reflect the goals of the existing Recovery Plans for these species.

FT - Listed as Threatened under the federal ESA;

S CA – southern California

FE - Listed as Endangered under the federal ESA

PIF – Partners in Flight

FC - Candidate to become a proposed species under the federal ESA

SSC - California species of special concern

The Summary of Alternatives table provides a comparison of the actions in each of the alternatives (Alternatives A, B, and C) that are described in the following text.

Alternative A (No Action Alternative) - Hopper Mountain NWR:

Under the No Action Alternative, the Service would continue to operate and maintain the refuge primarily to support the California Condor Recovery Program, with a limited number of Service-led volunteer opportunities and interpretive tours. The refuge would remain closed to public use. The specific activities that would continue under this alternative are listed in Table 2-1. Service-approved herbicides would be used for controlling vegetation. At Hopper Mountain NWR, approximately 30 acres are treated with glyphosate (Roundup ProMax or other similar herbicide) around facilities to reduce vegetation and protect structures from fire damage (about 10 acres) and for vegetation control in fields (about 20 acres). When chemicals (i.e., herbicides) are used, the Service would follow standard best management practices (BMPs), including adherence to all US Environmental Protection Agency (USEPA) and California EPA warning labels and application requirements, as well as the Service’s Pesticide Use Proposal (PUP) process regulations (as further discussed in Chapter 4, Effects on the Hopper Mountain NWR Physical Environment).

In accordance with 517 Departmental Manual (DM) 1 and 7 Refuge Manual 14, an integrated pest management (IPM) approach would be utilized, where practicable, to eradicate, control, or contain pest and invasive species (herein collectively referred to as pests) on the refuge. IPM would involve using

methods based upon effectiveness, cost, and minimal ecological disruption, which considers minimum potential effects to non-target species and the refuge environment. Pesticides may be used where physical, cultural, and biological methods or combinations thereof, are impractical or incapable of providing adequate control, eradication, or containment. Furthermore, pesticides would be used primarily to supplement, rather than as a substitute for, practical and effective control measures of other types. If a pesticide would be needed on the refuge, the most specific (selective) chemical available for the target species would be used unless considerations of persistence or other environmental and/or biotic hazards would preclude it. In accordance with 517 DM 1, pesticide usage would be further restricted because only pesticides registered with the USEPA in full compliance with the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and as provided in regulations, orders, or permits issued by USEPA may be applied on lands and waters under refuge jurisdiction.

Environmental harm by pest species would refer to a biologically substantial decrease in environmental quality as indicated by a variety of potential factors including declines in native species populations or communities, degraded habitat quality or long-term habitat loss, and/or altered ecological processes. Environmental harm may be a result of direct effects of pests on native species including preying and feeding on them; causing or vectoring diseases; preventing them from reproducing or killing their young; out-competing them for food, nutrients, light, nest sites or other vital resources; or hybridizing with them so frequently that within a few generations, few if any truly native individuals remain. In contrast, environmental harm can be the result of an indirect effect of pest species. For example, decreased waterfowl use may result from invasive plant infestations reducing the availability and/or abundance of native wetland plants that provide forage during the winter.

Environmental harm may also include detrimental changes in ecological processes. For example, cheatgrass infestations in shrub steppe greatly can alter fire return intervals displacing native species and communities of bunch grasses, forbs, and shrubs. Environmental harm may also cause or be associated with economic losses and damage to human, plant, and animal health. For example, invasions by fire-promoting grasses that alter entire plant and animal communities eliminating or sharply reducing populations of many native plant and animal species can also greatly increase fire-fighting costs.

Throughout the life of the CCP, most proposed pesticide uses on the refuge would be evaluated for potential effects to refuge biological resources and environmental quality. These potential effects would be documented in "Chemical Profiles" (to be included in the IPM Plan). Pesticide uses with appropriate and practical best management practices (BMPs) for habitat management as well as cropland/facilities maintenance would be approved for use on the refuge where there likely would be only minor, temporary, and localized effects to species and environmental quality based upon non-exceedance of threshold values in Chemical Profiles. However, pesticides may be used on a refuge where substantial effects to species and the environment are possible (exceed threshold values) in order to protect human health and safety (e.g., mosquito-borne disease).

Alternative B (Preferred Alternative) - Hopper Mountain NWR:

Condor management support –

Alternative B for Hopper Mountain NWR would include all actions in Alternative A, plus expand on-refuge condor monitoring, facilities, and coordination with neighbors. Under Alternative B, the Service would survey, map, and monitor condor roosts and expand remote population monitoring capabilities by providing an on-refuge remote telemetry station. The Service would also construct a new pole barn for equipment storage and replace unusable housing to increase temporary housing capacity for staff and volunteers by up to 8 individuals to a total capacity of up to 16. Coordination with regional neighbors would be expanded to promote natural foraging opportunities for condors and enhance foraging habitat. The Service would also seek to reduce the carbon footprint (emissions) from refuge operations.

Wildlife and habitat management –

Under Alternative B for Hopper Mountain NWR, the Service would gather baseline data and conduct surveys for special status species, develop partnerships for research supporting refuge goals, more actions to enhance quality of grassland, riparian, southern California black walnut and oak woodland habitat for migratory and other birds and wildlife; more actions to prevent invasive plants and animals; develop an Integrated Pest Management (IPM) Plan for early detection/rapid response; and for all habitat types, develop a Habitat Management Plan (HMP) that considers climate change.

Grassland: Use best management practices to reduce invasive plants, and use targeted grazing and prescribed fire to reduce fuel loads and manage habitat.

Riparian: Develop an annual monitoring program; inventory springs; partner with and develop riparian management practices to share with oil and gas operators to protect riparian resources; replace existing water control structure to improve adaptive management; manage water to improve wildlife value for special status species.

Black walnut and oak woodland: Reduce fuel loads to sustain regeneration of woodlands and promote sustainable age class distribution.

Visitor services –

Alternative B for Hopper Mountain NWR would include all actions in Alternative A, plus develop a Visitor Services Plan, increase outreach and volunteer opportunities, update outreach materials, expand the refuge website, develop a refuge brochure and/or newsletter, coordinate with U.S. Forest Service on condor interpretation, offer at least 4 regular refuge tours annually, improve safety, and post the entire refuge boundary.

Alternative C - Hopper Mountain NWR:*Condor management support –*

Alternative C for Hopper Mountain NWR would expand monitoring (same as Alternative B) plus increase condor volunteer monitoring activities; twice per year trap and sample (same as Alternative A); provide sites to support Recovery Program activities to maximize survivorship (same as Alternative A); increase temporary quarters' capacity by adding 2 RV hookups; promote conservation of working landscapes and coordinate with neighboring landowners to promote natural feeding opportunities (same as Alternative A); survey, map, and monitor roost sites (same as Alternative B); and develop roost management practices (same as Alternative B).

Wildlife and habitat management –

Under Alternative C for Hopper Mountain NWR, the Service would implement the following wildlife and habitat management activities.

Grassland: Same as Alternative B plus conduct, facilitate, and/or support research to identify invasive plant biology and ecology and to evaluate techniques for controlling invasive plant species but without the use of chemical techniques (i.e., without pesticides or herbicides).

Riparian and wetland: Same as Alternative B plus monitor water quality and quantity; use IPM but without the use of chemical techniques (i.e., without pesticides or herbicides); same as Alternative A for the man-made wetland, no actions except monitor it for reed canarygrass.

Black walnut and oak woodland: Same as Alternative A for fire protection plus create additional fuel breaks around select walnut stands. Same as Alternative B for habitat management plus promote recruitment by seed collection and banking; use targeted seasonal grazing to reduce competition with

walnut and oak seedlings; support research on invasive plants; and manage invasives without using chemical techniques.

Visitor services –

Alternative C for Hopper Mountain NWR for *outreach*, would include the same as Alternative B, plus form outreach partnerships with City of Fillmore and schools; for *visitor use*, include limited guided tours (as in Alternative A), plus work with Friends groups to offer more joint walks, talks; study options for public access and determine feasibility of wildlife-dependent recreation; and for *volunteers*, include the same opportunities in Alternative B, plus work with Friends groups to offer more volunteer opportunities; for safety, include the same as Alternative B, posting the refuge boundary and maintaining fuel breaks.

Bitter Creek NWR Alternatives

Table 2-2. Bitter Creek NWR: Summary of Alternatives

Issue Area	Alternative A: No Action (Maintain Current Management)	Alternative B: Preferred	Alternative C
GOAL 1: Support the recovery strategies of the California Condor Recovery Program on Bitter Creek NWR*			
California condor (<i>Gymnogyps californianus</i>) (FE) Recovery Program – condor survivorship	<ul style="list-style-type: none"> • Provide and maintain a flight pen for temporary holding of condors for treatments and transmitter maintenance • VHF, GPS, and visual population monitoring program • Maintain at least 2 sites for the Recovery Program to trap and process condors (assess body condition, attach transmitters) • Reduce fuels near facilities (mowing) and conduct fire suppression to protect facilities from wildland fires 	<ul style="list-style-type: none"> • Alternative A, plus expand remote population monitoring capabilities by providing a site for remote telemetry stations on refuge (e.g., GPS) • Build ~1,000 sf. condor treatment facility for on-site care of sick or injured condors 	<ul style="list-style-type: none"> • Alternative A, plus increase volunteer monitoring activities (on-refuge)
California condor Recovery Program – release site	<ul style="list-style-type: none"> • Maintain condor flight pen to hold pre-release birds and for releases • Maintain feeding sites for newly released condors • Reduce fuels near facilities (mowing) and conduct fire suppression to protect facilities from wildland fires • Maintain access trails to support condor activities • Maintain disturbance-free environment 	<ul style="list-style-type: none"> • Same as Alternative A 	<ul style="list-style-type: none"> • Same as Alternative A

<p>California condor Recovery Program – activity support</p>	<ul style="list-style-type: none"> • Maintain existing housing and other facilities for use by Service staff, volunteers and partners (up to 5 persons total) 	<ul style="list-style-type: none"> • Alternative A, plus expand available housing by constructing 2 RV hook-ups (up to 9 persons total) 	<ul style="list-style-type: none"> • Alternative A, plus expand available housing by constructing 2 RV hook-ups and lodging (up to 10 persons total)
<p>California condor Recovery Program – critical habitat</p>	<ul style="list-style-type: none"> • No actions 	<ul style="list-style-type: none"> • Pursue possible land exchange with BLM to consolidate management of Headwall oaks roost site • Survey, map, and monitor existing and historical roost sites on-refuge • Implement Recovery Program's roost management practices • Evaluate, monitor, and mitigate threats to roost sites (e.g., fire) • Develop predator management measures (as part of IPM Plan) • Coordinate with U.S. Forest Service and other agencies leading efforts to assess effects of climate change on roosting habitat 	<ul style="list-style-type: none"> • Create fuel breaks to protect important roost sites on-refuge
<p>California condor Recovery Program – foraging habitat</p>	<ul style="list-style-type: none"> • Coordinate with ranchers to allow condors to feed on natural livestock mortalities • Participate in annual ungulate surveys with Wind Wolves Preserve to determine population trends 	<ul style="list-style-type: none"> • Same as Alternative A plus coordinate with hunters about leaving non-lead carcasses in the field; define and map habitat characteristics of condor foraging areas • Remove unnecessary refuge fencing; replace fences with wildlife-friendly fencing, and other management to promote native ungulates on refuge 	<ul style="list-style-type: none"> • Same as Alternative B
<p>Carbon emissions</p>	<ul style="list-style-type: none"> • No actions 	<ul style="list-style-type: none"> • Quantify the carbon footprint from annual operations • Develop measures to reduce emissions • Improve efficiency where feasible • Educate and empower staff and volunteers about activities that offset carbon emissions and climate change effects on refuge resources 	<ul style="list-style-type: none"> • Same as Alternative A

GOAL 2: Protect and enhance Bitter Creek NWR grasslands to promote ecologically sound conditions to support a diversity of migratory birds and special status plant and animal species*			
<p>Grassland and other special status species and migratory birds</p>	<ul style="list-style-type: none"> • Game cameras placed opportunistically near water features 	<ul style="list-style-type: none"> • Within 5 years, develop and implement standardized data collection for focal plant and animal species w/ emphasis on special status species • Within 5 years, survey and map current distribution of select grassland special status species, including migratory birds • Survey and map current distribution of unique native grass and forb communities • Evaluate potential for establishing populations of endangered CA jewelflower (<i>Caulanthus californicus</i>)(FE) into juniper woodland or grassland • Survey for sphinx moth (<i>Euproserpinus euterpe</i>)(FT) 	<ul style="list-style-type: none"> • Same as Alternative B
<p>San Joaquin Valley special status species: San Joaquin kit fox (<i>Vulpes macrotis mutica</i>)(FE), giant kangaroo rat (<i>Dipodomys ingens</i>)(FE), blunt-nosed leopard lizard (<i>Gambelia sila</i>)(FE), and grassland obligate birds*</p>	<ul style="list-style-type: none"> • No treatments (e.g., no grazing, no prescribed burning) • Fire suppression 	<ul style="list-style-type: none"> • Within 10 years, identify and map refuge grasslands with potential to support San Joaquin Valley (SVJ) special status species • Use various grassland management tools (e.g., grazing, mowing, herbicide, over-seeding with native perennials) to meet SVJ habitat objectives • Use prescribed grazing if appropriate to meet habitat objectives in SVJ grasslands • Monitor vegetation and animal community responses to management actions • Coordinate with neighboring land management agencies and organizations to share best practices for achieving objectives 	<ul style="list-style-type: none"> • Alternative B, plus more intensive SVJ short grass restoration in potential SVJ special status species area that is identified and mapped in Alternative B

<p>Mosaic of grassland structure and diversity to support grassland birds</p>	<ul style="list-style-type: none"> • No treatments (e.g., no grazing, no prescribed burning) • Fire suppression 	<ul style="list-style-type: none"> • Develop a long-term restoration strategy for grasslands as part of Habitat Management Plan that addresses climate change adaptation • Use various grassland management tools (e.g., grazing, mowing, herbicide, over-seeding with native perennials) to meet mosaic habitat objectives • Consider prescribed grazing through various land management agreements • Develop and implement protocols to monitor vegetation and animal responses and evaluate data to inform adaptive management • Coordinate with neighboring land management agencies and organizations to share best practices for achieving objectives • Use prescribed grazing to preserve grassland mosaic and allow oak recruitment • Monitor native plant composition and track succession and density 	<ul style="list-style-type: none"> • Alternative B, plus more intensive grassland restoration in areas identified and mapped in Alternative B
<p>Grassland invasive plant species</p>	<ul style="list-style-type: none"> • Opportunistic manual removal of yellow star thistle (<i>Centaurea solstitialis</i> L.), non-native mustards (<i>Brassicaceae</i> sp.), and others 	<ul style="list-style-type: none"> • Develop and implement step-down IPM Plan, including prioritization and early detection/rapid response • Identify and map management of invasive plants • Use appropriate cost-effective IPM techniques to prevent infestation and reduce coverage of invasive plants • Evaluate use of prescribed livestock grazing to reduce invasive plants as part of IPM Plan • Conduct and/or support research to evaluate techniques for controlling invasive plant species 	<ul style="list-style-type: none"> • Alternative B, but without chemical techniques (i.e., without herbicides)

<p>Invasive animal species</p>	<ul style="list-style-type: none"> • No actions 	<ul style="list-style-type: none"> • Develop and implement feral and non-native animal management and early detection/rapid response as part of IPM Plan • Proactively obtain necessary permits and authorizations for rapid response to target non-native and feral animals (quick removal) • Partner with adjacent landowners (e.g., Wind Wolves Preserve) to share info about and management for target species (e.g., feral swine) 	<ul style="list-style-type: none"> • Alternative B, plus conduct, facilitate, and/or support research to identify non-native animal biology and ecology and to evaluate techniques for controlling invasive animal species
<p>GOAL 3: Protect and enhance oak and other refuge woodlands for healthy ecological conditions to support special status species and an abundance and diversity of migratory birds*</p>			
<p>Special status species and woodland and savanna</p>	<ul style="list-style-type: none"> • No actions 	<ul style="list-style-type: none"> • Conduct vertebrate surveys and regularly scheduled point count surveys for birds • Inventory woodlands and savannas plant species diversity and age structure • Develop Habitat Management Plan for woodlands and a plan to monitor woodland health • Survey for Kern mallow, document in refuge GIS • Determine if additional woodland species should be considered as focal species 	<ul style="list-style-type: none"> • Same as Alternative B
<p>Woodland birds, including Nuttall's woodpecker, oak titmouse and western bluebird</p>	<ul style="list-style-type: none"> • No actions 	<ul style="list-style-type: none"> • Follow Partners in Flight management recommendations until Habitat Management Plan is developed • Every 5 years, evaluate natural oak regeneration using IHRMP decision key • Prior to plantings, evaluate the acorn production using IHRMP method • If natural regeneration is not sustainable, develop mixed woodland restoration program within Habitat Management Plan • Follow Habitat Management Plan to use exclusionary techniques to promote oak recruitment 	<ul style="list-style-type: none"> • Same as Alternative B

Woodland invasive species	<ul style="list-style-type: none"> • Opportunistic manual removal of yellow star thistle, invasive mustards • No existing IPM Plan 	<ul style="list-style-type: none"> • Use appropriate cost-effective IPM techniques to manage invasive species • Replace tree of heaven (<i>Ailanthus</i> sp.) with local ecotypes of native trees in select locations per the Habitat Management Plan 	<ul style="list-style-type: none"> • Alternative B, but without chemical techniques (i.e., without pesticides)
GOAL 4: Restore and maintain riparian and wetland communities to support native plants and wildlife*			
Riparian and wetland associated plants and wildlife	<ul style="list-style-type: none"> • Hydro-geomorphic studies in progress 	<ul style="list-style-type: none"> • Develop and implement an Avian Monitoring Plan for riparian and wetland areas • Conduct aquatic/riparian habitat assessment (including presence/absence for special status species, such as California red-legged frog (FT)) • Survey likely areas for vernal pools • If vernal pools are present, survey pools for listed species • Develop Habitat Management Plan for riparian/wetlands • Install wind/rain gauge weather station 	<ul style="list-style-type: none"> • Same as Alternative B
Springs, wetlands, and water rights	<ul style="list-style-type: none"> • Spring locations mapped 	<ul style="list-style-type: none"> • Conduct inventory of springs and wetlands including water quality • Research, document, and evaluate water rights on the refuge 	<ul style="list-style-type: none"> • Same as Alternative B
Natural spring flow (hydrology) to support native plants and wildlife	<ul style="list-style-type: none"> • Water diverted for stock tanks and water storage (fire preparedness) 	<ul style="list-style-type: none"> • Develop and implement a Habitat Management Plan that addresses riparian restoration needs • Reduce and modify water control structures to restore natural flows and eliminate diversions of water except as needed for fire suppression, bunkhouse use, and prescribed grazing • Require exclusionary fencing to protect riparian areas and wetlands prior to implementation of prescribed grazing in adjacent grasslands • Define management units based on biological considerations by installing fencing (~20 miles) 	<ul style="list-style-type: none"> • Alternative B, plus, based on 2011 HGM recommendations, remove all water diversions and artificial stock tanks except as needed for fire suppression, bunkhouse use, and prescribed grazing • Restore all springs to natural flow conditions • Planting/seeding of native riparian plants (focus on those beneficial to special status species)

		<ul style="list-style-type: none"> Implement early detection/rapid response to invasives 	
Tricolored blackbird (<i>Agelaius tricolor</i>) (SSC)	<ul style="list-style-type: none"> Periodic tricolored blackbird surveys 	<ul style="list-style-type: none"> Coordinate with partners to conduct bi-annual tricolored blackbird surveys on the refuge Encourage growth of nettles and willows near historic tricolored blackbird habitat Fence out livestock and native grazers from historic tricolored blackbird habitat Consider livestock grazing near tricolored blackbird breeding colonies to increase tricolored blackbird food sources 	<ul style="list-style-type: none"> Same as Alternative B
Riparian invasive plants (primarily tamarisk (<i>Tamarix</i> sp.))	<ul style="list-style-type: none"> Partnership with NGOs to remove tamarisk 	<ul style="list-style-type: none"> Alternative A, plus, develop and implement IPM Plan, including early detection/rapid response Partner with others to remove tamarisk on refuge using IPM techniques Survey seasonally for new occurrences of non-native invasives and treat within 30 days Re-vegetate treated areas with native species propagated from local cuttings per Habitat Management Plan 	<ul style="list-style-type: none"> Alternative B, plus increase tamarisk removal area to include upstream to refuge boundary Coordinate with neighbors to reduce upstream, off-refuge sources of tamarisk
GOAL 5: Promote ecosystem function by enhancing landscape-level connectivity within the Transverse Ranges through coordinated management			
Connectivity	<ul style="list-style-type: none"> Annually maintain refuge road network (~26 miles) 	<ul style="list-style-type: none"> Evaluate internal road system to determine which roads support refuge purposes and the Recovery Program Reduce and avoid habitat degradation by closing/removing unneeded roads and annually maintaining selected roads Within 10 years, restore selected, erosion-prone roadbeds to natural conditions 	<ul style="list-style-type: none"> Same as Alternative B, plus improve selected roads to reduce adverse effects on water quality
Wildlife movement	<ul style="list-style-type: none"> Opportunistic removal of dilapidated fencing Some internal fencing replaced with wildlife-friendly fencing 	<ul style="list-style-type: none"> Monitor wildlife activity to identify high-use wildlife crossings Partner with Caltrans to install wildlife crossing 	<ul style="list-style-type: none"> Alternative B, plus remove all internal fencing

		<p>(and/or reduce-speed) signs at documented locations where wildlife is most likely to be present</p> <ul style="list-style-type: none"> • Within 5 years, remove or replace (with wildlife-friendly fencing) internal fencing at key wildlife corridors • Within 10 years, replace non-wildlife friendly fences with wildlife-friendly fencing at key wildlife corridors to promote ungulate and other wildlife movement • Coordinate with neighboring agencies and organizations to establish commonly recognized landscape management area with partnerships or agreements • Within 2 years, coordinate with neighboring land management agencies and organizations to develop best practices for improving connectivity across boundaries 	
<p>GOAL 6: Provide quality information and education to increase the public's appreciation and understanding of the refuge and its wildlife, habitats, and cultural resources</p>			
Outreach and education	<ul style="list-style-type: none"> • Conduct occasional refuge tours • Refuge closed to public use 	<ul style="list-style-type: none"> • Alternative A, plus conduct 5 regularly scheduled refuge tours • Refuge open to public use 	<ul style="list-style-type: none"> • Refuge open to public use
Volunteer opportunities	<ul style="list-style-type: none"> • Limited number of volunteer projects on the refuge • Coordinate volunteer opportunities with Friends of California Condors Wild and Free on select projects • 	<ul style="list-style-type: none"> • Alternative A, plus provide volunteer opportunities such as plant propagation, planting, invasive plant removal, plant surveys, and wildlife surveys • Work with Friends of California Condors Wild and Free and other organizations to offer joint walks, talks, and volunteer opportunities 	<ul style="list-style-type: none"> • Same as Alternative B
Visitor use	<ul style="list-style-type: none"> • Limited number of tours and hikes on the refuge • Informal roadside wildlife observation 	<ul style="list-style-type: none"> • Establish refuge interpretive 1-mile loop trail and 5-car parking off Klipstein Canyon Road • At former Cliff Hudson house site: remove dilapidated structures, restore some historic/cultural structures for interpretation, build 	<ul style="list-style-type: none"> • Establish condor interpretive hiking trail near upper refuge sign off Cerro Noroeste Road • Establish docent program

		refuge administrative office, and install visitor contact station and parking <ul style="list-style-type: none"> Establish visitor contact station and pull-out condor observation point near upper refuge sign off Cerro Noroeste Road 	
Cultural resources	<ul style="list-style-type: none"> Initial assessment of historic structures in progress 	<ul style="list-style-type: none"> Identify archeological sites that coincide with existing and planned roads, facilities, public use areas, and habitat projects Develop GIS layer for cultural resources Evaluate threatened and impacted sites and structures for eligibility to the National Register of Historic Places Prepare and implement activities to avoid and mitigate impacts to sites and structures as necessary 	<ul style="list-style-type: none"> Implement proactive historic preservation program Develop formal partnerships with Native tribes for cultural resources inventory, evaluation, and project monitoring Implement other recommendations included in the Service Cultural Resources Review for Bitter Creek NWR
Safety and law enforcement	<ul style="list-style-type: none"> Periodic patrols by law enforcement (LE) (refuge closed to public use) Maintain existing boundary signs Periodic coordination with neighboring agencies on LE Maintain roads for safe access by staff, volunteers, guided tours, LE, and fire protection 	<ul style="list-style-type: none"> Post 100% of boundary to support LE Partner with neighboring land management agencies to provide LE on refuge 	<ul style="list-style-type: none"> Same as Alternative B
	<ul style="list-style-type: none"> Maintain needed fuel breaks Suppress wildfires to protect life, structures and natural and cultural resources 	<ul style="list-style-type: none"> Same as Alternative A 	<ul style="list-style-type: none"> Same as Alternative A

*The actions will be in accordance with and reflect the goals of the existing Recovery Plans for these species.

FT - Listed as Threatened under the federal ESA

FE - Listed as Endangered under the federal ESA

FC - Candidate to become a proposed species under the federal ESA

SSC - California state species of special concern

BMP – Best management practices (see Appendix 1)

The Summary of Alternatives table provides a comparison of the actions in each of the alternatives (Alternatives A, B, and C) that are described in the following text. A graphical representation of the visitor services alternatives is shown in the figure Alternatives A, B and C for Bitter Creek National Wildlife Refuge, following the References section of this Environmental Assessment.

Alternative A (No Action Alternative) - Bitter Creek NWR:

Under the No Action Alternative, the Service would continue to operate and maintain the refuge primarily to support the California Condor Recovery Program, with a limited number of Service-led volunteer opportunities and interpretive tours. The refuge would remain closed to public use. The specific activities that would continue under this alternative are listed in Table 2-2. Service-approved herbicides/pesticides would be used as part of an IPM plan for invasive species control. Pesticides used at Bitter Creek NWR include: Transline (clopyralid) application on approximately 25 acres and Pathfinder II (triclopyr butoxyethyl ester) application on approximately 35 acres. When chemicals are used, the Service would follow standard BMPs including adherence to all EPA warning labels and application requirements, as well as the Service's PUP process regulations (as further discussed in Chapter 4).

In accordance with 517 Departmental Manual (DM) 1 and 7 Refuge Manual 14 (as described under Alternative A for Hopper Mountain NWR), an integrated pest management (IPM) approach would be utilized, where practicable, to eradicate, control, or contain pest and invasive species on the refuge. Needed fuel breaks would be maintained and wildfires would be suppressed to protect life, structures, and natural and cultural resources.

Alternative B (Preferred Alternative) - Bitter Creek NWR:

Under Alternative B, the Service would implement more condor and habitat management activities and visitor services activities than in Alternative A. The Service would open portions of the refuge for public use. The specific activities that would continue under this alternative are listed in Table 2-2.

Condor management support –

Alternative B for Bitter Creek NWR would include all actions in Alternative A, plus maximize survivorship by adding 1,000-square-foot condor treatment facility, increase housing capacity by up to 4 individuals to a total capacity of up to 9 by adding 2 RV hookups, provide a site for a remote telemetry station to expand condor monitoring, enhance condor foraging and roosting habitat, improve condor predator management, pursue possible land trades or management agreements with BLM to consolidate management of Headwall oaks roost area, participate with partners in surveys for wild ungulates, and measure and reduce the carbon footprint (emissions) from refuge operations.

Wildlife and habitat management –

Alternative B for Bitter Creek NWR would include all actions in Alternative A, plus obtain baseline data on plants and animals with emphasis on special status species that use grasslands, riparian and wetland communities, oak and other refuge woodlands; develop an IPM Plan with early detection/rapid response to reduce invasive plants and animals; analyze IPM techniques for invasive species control; restore habitat quality by reducing internal roads; coordinate with adjacent conservation land managers and agencies to share practices to achieve objectives for San Joaquin Valley special status species; reduce man-made barriers to wildlife movement; and for all habitat types develop an HMP that considers climate change.

Grassland: Use grazing and/or other methods to achieve a mosaic of grass heights on up to 9,000 acres comprised of up to 1,300 acres to support special status San Joaquin Valley species and up to 7,000 acres to support a diversity of special status grassland birds.

Riparian and wetland: Restore and enhance riparian resources by modifying water control structures to restore natural flows and adding grazing exclusion fencing, remove invasive tamarisk (*Tamarix* sp.) (using Pathfinder II on approximately 35 additional acres) and selectively replant with native riparian species, survey for vernal pools and unique grasses/forbs, develop an Avian Monitoring Plan, evaluate water rights, install a wind/rain gauge weather station, and conduct bi-annual tricolored blackbird surveys.

Oak woodland: Promote sustainable age class distribution, remove invasive tree of heaven (*Ailanthus altissima*) and selectively replant with native trees.

Landscape connectivity –

Alternative B for Bitter Creek NWR would evaluate the internal road system, reduce habitat degradation by closing/removing unneeded roads and annually maintaining selected roads, restore erosion-prone roads, monitor wildlife activity to identify high-use wildlife crossings, install wildlife crossing signs, remove unnecessary internal fencing, replace remaining internal fences with wildlife-friendly fences, and coordinate with neighboring conservation land managers and organizations to improve connectivity across boundaries.

Visitor services –

Alternative B for Bitter Creek NWR would include all actions in Alternative A, plus develop a Visitor Services Plan; open an interpretive 1-mile loop trail off Klipstein Canyon Road; remove/restore structures at the former Cliff Hudson homestead site and install a refuge administrative office and visitor contact station; install a condor observation point on Cerro Noroeste Road; increase outreach, volunteer opportunities, and interpretation by updating outreach materials, expanding the refuge website, and developing a refuge brochure and/or newsletter; and enhance safety and law enforcement by posting the refuge boundary and partnering with other agencies to provide refuge law enforcement. Visitor services alternatives are shown in the figure Alternatives A, B and C for Bitter Creek National Wildlife Refuge, following the References.

Alternative C - Bitter Creek NWR:

Under Alternative C, the Service would implement the most condor and habitat management and visitor services activities; more than in Alternative B. The specific activities that would continue under this alternative are listed in Table 2-2. The Service would open portions of the refuge for public use.

Condor management support –

Alternative C for Bitter Creek NWR would include the same as Alternative B, plus increase volunteer monitoring activities, expand quarters by 2 additional RV hookups (4 total), and create fuel breaks to protect key roosts.

Wildlife and habitat management –

Alternative C for Bitter Creek NWR would include the same as Alternative B, plus establish formal partnerships to coordinate management across boundaries and remove all internal refuge fencing.

Grassland: Evaluate the effectiveness of adding more intensive short grass restoration on 2,000 acres to support San Joaquin Valley special status species, manage invasive plants without using chemical techniques (i.e., without herbicides), and support research on effects of non-native invasive animals on refuge resources.

Riparian and wetland: Except as needed for fire suppression, bunkhouse use, and prescribed livestock grazing needs, remove all water diversions and stock tanks to restore springs to natural flows, replant native riparian areas to support special status species, coordinate removal of off-refuge tamarisk sources with neighboring landowners, and improve select roads.

Oak woodland: Manage invasive tree of heaven without chemical techniques (i.e., without herbicides).

Landscape connectivity –

Alternative C for Bitter Creek NWR would include the same as Alternative B, plus improve selected roads and remove all internal fencing.

Visitor services –

Alternative C for Bitter Creek NWR would include the same as Alternative B, plus further expand outreach, volunteer activities, and interpretation; designate a volunteer coordinator; establish a docent program; and increase partnerships with tribal representatives. Visitor services alternatives are shown in the figure Alternatives A, B and C for Bitter Creek National Wildlife Refuge, following the References.

Blue Ridge NWR Alternatives

Table 2-3. Blue Ridge NWR: Summary of Alternatives

Issue Area	Alternative A: No Action (Maintain Current Management)	Alternative B: Preferred	Alternative C
GOAL 1: Support the recovery strategies of the California Condor Recovery Program on Blue Ridge NWR*			
California condor (<i>Gymnogyps californianus</i>) (FE) Recovery Program	<ul style="list-style-type: none"> No actions 	<ul style="list-style-type: none"> Expand remote population monitoring by providing a site for remote telemetry stations on-refuge 	<ul style="list-style-type: none"> Alternative B, plus increase volunteer monitoring activities
	<ul style="list-style-type: none"> No actions 	<ul style="list-style-type: none"> Survey and map existing and historical roost sites on-refuge Evaluate and monitor threats to condor roost sites Minimize human disturbance near condor roosting areas Coordinate with BLM to sustain roost trees 	<ul style="list-style-type: none"> Alternative B, plus active snag management Implement Recovery Plan roost management practices
	<ul style="list-style-type: none"> No actions 	<ul style="list-style-type: none"> Quantify and maintain current quantity and quality of condor foraging habitat defined in 1985 multi-agency Blue Ridge Habitat Management Plan 	<ul style="list-style-type: none"> Same as Alternative A
	<ul style="list-style-type: none"> No actions 	<ul style="list-style-type: none"> Improve efficiency at refuge and Refuge Complex Headquarters 	<ul style="list-style-type: none"> Same as Alternative A
GOAL 2: Maintain healthy and representative examples of Sierra foothill communities, such as coniferous forests, woodland savannas, and chaparral			
Special status species	<ul style="list-style-type: none"> No actions 	<ul style="list-style-type: none"> Conduct presence/absence surveys of special status species Assess water sources and flow regimes Conduct monitoring to identify climate change-related effects 	<ul style="list-style-type: none"> Alternative B, plus develop comprehensive refuge species list

Issue Area	Alternative A: No Action (Maintain Current Management)	Alternative B: Preferred	Alternative C
Wildfire risk, public safety	<ul style="list-style-type: none"> Natural succession with thinning and prescribed burning at wildland urban interface and roads in accordance with the current Fire Management Plan 	<ul style="list-style-type: none"> Use prescribed fire as appropriate to develop old growth forests Implement appropriate thinning with understory prescribed burns to develop old-growth characteristics within mixed conifer forest 	<ul style="list-style-type: none"> Same as Alternative A, plus establish wind/rain gauge weather station on refuge
GOAL 3: Provide quality interpretive and wildlife-dependent recreational opportunities for refuge visitors and the community to promote a deeper understanding and appreciation of the refuge and the California condor			
Visitor use	<ul style="list-style-type: none"> No actions; refuge closed to public use 	<ul style="list-style-type: none"> Establish interpretive hiking trails using existing roads, trails/fire roads, while avoiding sensitive condor roosting and nesting areas Ensure adequate signage for refuge visitors Refuge open to public use 	<ul style="list-style-type: none"> Same as Alternative A
Interpretation	<ul style="list-style-type: none"> No actions 	<ul style="list-style-type: none"> Install interpretive signage at boundaries, roads, trails/trailheads on refuge (including lead awareness) 	<ul style="list-style-type: none"> Install basic interpretive signs at boundaries only
Volunteers	<ul style="list-style-type: none"> No actions 	<ul style="list-style-type: none"> Provide volunteer opportunities, such as invasive plant removal, plant and wildlife surveys, and trail building/cleanup 	<ul style="list-style-type: none"> Work with Friends of California Condors Wild and Free and other organizations to offer joint walks, talks, and volunteer opportunities
Safety and law enforcement	<ul style="list-style-type: none"> Periodic patrols by law enforcement (refuge closed to public use) 	<ul style="list-style-type: none"> Complete posting of full boundary Cooperate with neighboring land management agencies to provide LE on refuge 	<ul style="list-style-type: none"> Same as Alternative B

*The actions will be in accordance with and reflect the goals of the existing Recovery Plans for these species.

FT - Listed as Threatened under the federal ESA;

FE - Listed as Endangered under the federal ESA;

FC - Candidate to become a proposed species under the federal ESA

The Summary of Alternatives table provides a comparison of the actions in each of the alternatives (Alternatives A, B, and C) that are described in the following text.

Alternative A (No Action Alternative) - Blue Ridge NWR:

Under the No Action Alternative, the Service would continue to operate and maintain the refuge primarily to support the California Condor Recovery Program by conserving designated critical habitat for the condor. The refuge would remain closed to public use. The specific activities that would continue under this alternative are listed in Table 2-3.

In accordance with 517 Departmental Manual (DM) 1 and 7 Refuge Manual 14 (as described under Alternative A for Hopper Mountain NWR), an integrated pest management (IPM) approach would be utilized, where practicable, to eradicate, control, or contain pest and invasive species on the refuge.

Alternative B (Preferred Alternative) - Blue Ridge NWR:

Under Alternative B, the Service would implement more condor and habitat management activities and visitor services activities than in Alternative A. The Service would open portions of the refuge for public use. The specific activities that would continue under this alternative are listed in Table 2-3.

Condor management support –

Alternative B for Blue Ridge NWR would include all actions in Alternative A, plus expand remote condor monitoring; coordinate with partners and communication tower stakeholders to minimize potential adverse effects to condors; survey, map and monitor refuge roost sites; implement 1985 Blue Ridge Management Plan roost management objectives; and coordinate with partners on effects of climate change on roost snags, wildfires, and water availability.

Wildlife and habitat management –

Under Alternative B for Blue Ridge NWR, the Service would conduct special status species surveys, develop an IPM Plan for early detection/rapid response to invasive species, use appropriate thinning and prescribed fire to develop old-growth forests, support Fire Safe Councils, and protect roost sites from fire.

Visitor services –

Under Alternative B for Blue Ridge NWR, the Service would develop a Visitor Services Plan, establish hiking trails, install boundary and interpretive signage at key locations, update outreach materials, expand the refuge website, develop a refuge brochure, provide volunteer opportunities, and collaborate with partners to increase law enforcement.

Alternative C - Blue Ridge NWR:

Under Alternative C, the Service would implement more condor and habitat management activities than in Alternative B but fewer visitor services activities than in Alternative B. The refuge would remain closed to public use. The specific activities that would continue under this alternative are listed in Table 2-3.

Condor management support –

Alternative C for Blue Ridge NWR would include the same actions as Alternative B, plus more volunteer monitoring and more snag roost management.

Wildlife and habitat management –

Under Alternative C for Blue Ridge NWR, the Service would include the same actions as Alternative B, plus develop a comprehensive refuge species list, participate in weed management groups, and add a refuge wind/rain gauge weather station.

Visitor services –

Under Alternative C for Blue Ridge NWR, the Service would include the same actions as Alternative A (no actions, refuge closed to public use), plus install interpretive signs only at boundaries and work with partners to offer tours and volunteer opportunities; explore development of a Blue Ridge NWR Friends organization, and maintain the same increased law enforcement as in Alternative B.

Proposed Action Criteria

The planning policy that implements the Refuge Improvement Act 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 B 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 the refuge;
- provides guidance for achieving each refuge's vision and 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 endangered species recovery.

Staffing Needs

Under Alternatives B and C, the refuge is proposing 5 new permanent positions: 1 Maintenance Worker, 1 Park Ranger/Law Enforcement Officer, and 3 Biological Technicians. The effects of adding new permanent positions are analyzed in terms of the effects of the proposed management actions implemented by the staff; the actions differ among alternatives and are analyzed within the resource sections in Chapter 4, Environmental Consequences.

The Preferred Alternative

Alternative B is the preferred alternative. The preferred alternative was identified based on the analysis presented in the Draft CCP/EA and modified in the Final CCP/EA following the completion of the public comment period based on comments received from other agencies, tribal governments, non-governmental organizations, or individuals. The action ultimately selected and described in the final CCP was determined, in part, by the comments received on the Draft EA. The proposed action presented in the Draft CCP is the same as the preferred alternative presented in this version, except the error in Table 2-2 of the Draft EA was corrected in the Final EA, as described in detail in Appendix K to the CCP.

Chapter 3. Affected Environment

Chapter 3 of the CCP provides a detailed description of the affected environment for Hopper Mountain, Bitter Creek, and Blue Ridge NWRs.

Chapter 4. Environmental Consequences

The direct, indirect, and cumulative effects of each alternative to the Comprehensive Conservation Plan (CCP) are presented here, along with Best Management Practices (BMPs) to mitigate adverse effects. Avoidable and unavoidable adverse impacts are presented for each aspect of the environment, including the physical, biological, and social environment. Since the national wildlife refuges (NWRs) within the Hopper Mountain NWR Complex are not contiguous, the effects for each alternative and resource are presented separately for the Hopper Mountain NWR, Bitter Creek NWR, and Blue Ridge NWR, as shown in sections 4.1, 4.2, and 4.3, respectively. The current conditions of these resources are fully described in Chapter 3 of the CCP.

The environmental consequences analysis describes the effects of 3 alternatives, as defined in Chapter 2: Alternative A (No Action), Alternative B (Preferred Alternative), and Alternative C. Alternative A assumes the continuation of current management conditions at each of the 3 NWRs and serves as a

baseline for comparing the effects of Alternatives B and C. The effects analyzed for Alternative A reflect the change in condition of a resource relative to current baseline conditions in consideration of current management practices and regional trends. For each NWR, the effects of Alternative A are presented first, followed by the effects of Alternatives B and C. The effects of Alternatives B and C reflect the net change in the resource that could occur from implementing new management regimes at the NWRs relative to current management regimes (i.e., no action). Cumulative effects for each alternative are presented at the end of the section for each NWR, along with a discussion of environmental justice concerns and climate change. The alternatives analysis focuses on management actions that may have ground disturbing effects. Many of the current and proposed strategies involve developing partnerships to support research, modeling activities to investigate potential climate change impacts on refuge resources, or developing step-down management plans. These types of activities do not result in any physical impacts; therefore, they are not analyzed in this chapter.

With respect to mineral resources, oil and gas operations would continue to operate at Hopper Mountain NWR under each alternative, which includes 4 oil production wells (3 active and 1 inactive). The Service does not control the mineral rights at Hopper Mountain and does not have discretion over the oil and gas operations. Therefore, the effects of the oil and gas operations are not evaluated. In accordance with the Service Manual 612 FW 2, Oil and Gas, section 2.4, the Service would continue to maximize protection of refuge resources to the extent possible, while entities exercise non-federal oil and gas rights.

The purpose of this analysis is to provide context and intensity of the effects for determining whether any effects rise to a level of significance that would warrant preparation of an environmental impact statement by decision makers. Furthermore, this analysis aids decision makers in identifying mitigation measures for avoiding, minimizing, rectifying, or reducing impacts over time, or compensating for adverse effects identified through the NEPA process. Through the NEPA process, the Service has developed specific BMPs that have been added to and are an integral part of the proposed action in order to avoid or minimize certain effects that would have otherwise occurred (see Appendix 1 of the EA). Many of these BMPs have been developed in coordination with regulatory agencies for reducing adverse effects of proposed management actions. In addition, during the CCP process and as part of compatibility determinations, the Service has developed specific management practices and restrictions that must be followed to ensure compatible wildlife-dependent recreational use of the refuges (see the restrictions included in the Compatibility Determinations in Appendix C of the CCP). Furthermore, the Service will develop project-specific permit conditions outlined in Special Use Permits (SUPs) or other agreements as part of the proposed action to further reduce adverse effects from wildlife-dependent recreational use of the refuges. The potential benefits associated with these BMPs and the restrictions developed as part of compatibility determinations are already incorporated into the characterization of environmental effects presented for each alternative as appropriate. See Appendix 1 of the EA and Appendix C of the CCP for a description of the BMPs and land use compatibility restrictions to be implemented by the Service as part of the proposed action, respectively.

For determining significance, the Service defers to the Council on Environmental Quality (CEQ) regulations for describing significant impacts as established in 40 CFR 1508.27. Significance determinations must consider both the context and intensity of the effect. *Context* refers to the characterization of the short-term and long-term effects of the action in consideration of society as a whole, the affected region, interests, and locality. For most resource areas, the context of the analysis includes the Hopper Mountain NWR, Bitter Creek NWR, and Blue Ridge NWR and those areas immediately surrounding these refuges (typically the areas within the counties in which the refuges are located, including nearby counties in the case of Bitter Creek NWR). *Intensity* in this context refers to consideration of the severity of the effect as defined in 1508.27(b), including: beneficial and adverse effects; public health and safety; unique characteristics of the geographical area; controversy of the action; certainty or unknown risks; precedent setting actions; cumulative effects; impacts to cultural resources; effects on federally-listed species; and potential to violate a federal, state, or local law imposed for the protection of the environment.

4.1 Hopper Mountain National Wildlife Refuge

Table 4-1 presents a summary of the effects to resources at Hopper Mountain NWR from implementing the 3 alternatives. Resource specific effects are described in sections 4.1.1 through 4.1.14.

Table 4-1. Summary of Environmental Effects for each Alternative: Hopper Mountain NWR

Resource	Alternative A: No Action Alternative (Maintain Current Management)	Alternative B: Preferred (Relative to Alternative A: No Action)	Alternative C (Relative to Alternative A: No Action)
Physical Environment –Hopper Mountain NWR			
Geology and Soils	Minor short-term negative impact, fire management practices would temporarily expose soils to erosion.	Minor short-term negative impact from minor vegetation clearing for habitat management, prescribed grazing, maintaining hiking trails/roads, and minor construction and restoration projects, which would temporarily expose soils to erosion.	Similar to Alternative B. Overall, impacts would be slightly more negative than Alternative B due to more intensive habitat restoration and enhanced riparian hydrology restoration, which would temporarily expose soils to erosion.
Air Quality	Minor negative impact due to particulate emissions from pile burning. In addition, vehicle emissions would continue from management efforts, volunteer activity, and limited guided tours.	Minor negative impact from increased particulate emissions from prescribed burning for vegetation management, while minor positive impacts would occur from reducing carbon footprint.	Minor negative impact from increased particulate emissions from prescribed burning for vegetation management and slight increases in vehicle emissions from guided tours. Overall, impacts would be more negative than Alternative B due to expanded burning from vegetation clearing and no reduction of the carbon footprint.
Noise	Minor negative impact from vehicle and equipment access through local areas.	Similar to Alternative A.	Similar to Alternative A.
Water	Minor short-term negative impact to water quality from increased erosion, while no effect on hydrology.	Minor short-term negative effect on water quality from increased erosion (e.g., from prescribed grazing, habitat restoration, and construction activities), while positive effect on hydrology and water quality from riparian habitat restoration and improvements to man-made wetlands.	Similar to Alternative B. Overall, impacts would be slightly more intense than Alternative B due to more intensive habitat restoration.

Resource	Alternative A: No Action Alternative (Maintain Current Management)	Alternative B: Preferred (Relative to Alternative A: No Action)	Alternative C (Relative to Alternative A: No Action)
Biological Environment –Hopper Mountain NWR			
Vegetation	No short-term impact, as plant cover and communities would be maintained. Long-term minor positive to no impact from thinning and pile burning to reduce the risk of more severe fires in the long term.	Minor positive and negative effects on native plant species and plant communities, with the potential for localized moderate positive and negative effects from implementing the grassland Habitat Management Plan, enhanced IPM, riparian habitat protection and restoration, southern California black walnut and oak woodland habitat management measures, climate change adaptation, and enhanced volunteer programs that would assist in removing invasive species. Some species and areas may experience minor to moderate adverse impacts from habitat manipulation (e.g., prescribed grazing) and limited clearing, trampling of vegetation by volunteers, as well as loss of man-made wetlands habitat.	Minor positive and negative effects on native plant species and plant communities, with the potential for localized moderate positive and negative effects from implementing the grassland Habitat Management Plan, enhanced IPM (without chemicals), riparian habitat protection, woodland habitat management, climate change adaptation, and enhanced volunteer programs that would assist in removing invasive species. Some species and areas may experience minor to moderate adverse impacts from habitat manipulation (e.g., prescribed grazing) and trampling of vegetation by volunteers. Overall, positive impacts are similar to Alternative B.
Wildlife Resources	No impact to wildlife given the limited management at the refuge other than for supporting the California condor.	Minor to moderate positive impact to targeted wildlife species from enhanced habitat adaptive management, invasive species control, monitoring, research, and expanded volunteer programs benefiting wildlife, while some non-targeted species have the potential to experience local, minor to moderate adverse impacts from habitat manipulation (e.g., prescribed grazing using adaptive management), increases in disturbance from visitors and volunteers, and condor management.	Minor to moderate positive impact to targeted wildlife species from enhanced habitat adaptive management, invasive species control, enhanced monitoring, research, and expanded volunteer programs, while some non-targeted species have the potential to experience local, minor to moderate adverse impacts from habitat manipulation (e.g., prescribed grazing using adaptive management), increases in disturbance from visitors and volunteers, and condor management. Overall, Alternative C may generate slightly more positive impacts to wildlife in woodland, riparian, and wetland habitat, as compared to Alternative B.

Resource	Alternative A: No Action Alternative (Maintain Current Management)	Alternative B: Preferred (Relative to Alternative A: No Action)	Alternative C (Relative to Alternative A: No Action)
Special Status Species	Moderate positive impacts to condor survivorship, foraging, and habitat would continue from condor management activities at the refuge. Minor positive effects to other special status species populations, survivorship, and habitat quality where they occur.	Moderate positive impact from management measures to increase monitoring, survivorship, foraging, and habitat for condors. Limited public access would be controlled through adaptive management to prevent adverse impacts to condors, with additional enforcement. Minor to moderate positive, and minor adverse impacts (e.g., to rare plants), would occur to other special status species from enhanced habitat adaptive management, monitoring, research, staffing (biologists/enforcement), and enhanced volunteer efforts related to benefitting special status species, survivorship, and habitat quality.	Moderate positive impact from management measures to increase monitoring, survivorship, foraging, and habitat of condors. Alternative C would provide fewer benefits to condors as compared to Alternative B. Minor to moderate positive, and minor adverse impacts (e.g., to rare plants) would occur to other special status species from enhanced habitat adaptive management, monitoring, research, staffing, and enhanced volunteer efforts related to benefitting special status species, survivorship, and habitat quality. Alternative C would provide more benefits to special status species in woodland, riparian, and wetland habitat as compared to Alternative B.
Socioeconomic Environment –Hopper Mountain NWR			
Socioeconomics	Minor positive impact to the local economy. Staff and expenditure levels would remain the same.	Minor positive impact to the local economy from increased non-consumptive recreational use of the refuge and visitors, increased expenditures, and staffing changes. Prescribed grazing would also create economic opportunities for grazing agreement holders.	Minor positive impact from increased guided tours and volunteer participation, staffing, and expenditures. Prescribed grazing benefits would be similar to Alternative B.
Public Use	No change in public access, as the refuge would remain closed to public use with periodic law enforcement patrols and limited guided tours providing minor benefits.	Minor positive impact from increased visitor access, expanded outreach, and volunteer opportunities.	Minor positive impact from increased visitor access, expanded outreach, and volunteer opportunities. Overall, impacts are more positive than Alternative B.
Cultural Resources	Minor negative impact to yet unidentified sites due to human activity and management resulting in potential for disturbance of unknown cultural resources. Any future impacts minimized through cultural resources reviews and surveys, as required.	Minor negative impact from soil disturbance and increased public access (tour groups/volunteers) resulting in potential for disturbance of unknown cultural resources. Impacts minimized through cultural resources reviews and surveys, as required.	Minor negative impact from soil disturbance and increased public access (tour groups/volunteers) resulting in potential for disturbance of unknown cultural resources. Impacts minimized through cultural resources reviews and surveys, as required.
Environmental Justice	No impact.	Same as with Alternative A, no impact.	Same as with Alternative A, no impact.

Effects on the Hopper Mountain NWR Physical Environment

The Physical Environment section includes an analysis of the direct and indirect effects associated with each alternative to geologic resources, air quality, noise, and water resources of Hopper Mountain NWR. Additional cumulative effects may occur to a resource when the effects of past, present, and reasonably foreseeable actions in the area are added to the direct and indirect effects of the alternative being analyzed. Cumulative effects are addressed in section 4.1.12.

4.1.1 Geology and Soils – Hopper Mountain NWR

4.1.1.1 Alternative A – No Action

Continuation of current refuge management practices would have a minor adverse effect on soils and no adverse effects on geologic resources. Overall, there would be no change in impact from continuation of current measures. Maintenance activities across approximately 3.5 acres of the refuge (approximately 3 miles of roads) can involve thinning, mowing, disking, grading, and vegetation clearing to maintain fire breaks, fuels reduction near roads and facilities, and road maintenance. Such actions would result in temporary and localized exposure of erodible soils to water and wind erosion. In addition, human and vehicle access for research, inventory and monitoring, and interpretation; and equipment usage may result in localized compaction of soils. Vehicle access and heavy equipment usage (including vehicle and equipment) may also increase the potential for small releases of oils, grease, and other petroleum products to soils. Soil erosion control measures, avoidance of riparian and wetland habitat, adherence to Service regulations and policy, and BMPs discussed in Appendix 1 of the EA would reduce potential adverse effects to soils. Overall, these activities would result in minor adverse effects to soils.

Service-approved herbicides would be used for controlling vegetation. At Hopper Mountain NWR, approximately 30 acres are treated with glyphosate (Roundup ProMax or other similar herbicide) around facilities to reduce vegetation and protect structures from fire damage (about 10 acres) and for vegetation control in fields (about 20 acres). In accordance with BMPs (see Appendix 1 of the EA), the Service would maintain unsprayed buffer areas near aquatic habitats and other sensitive areas. Glyphosate, the active ingredient in Roundup ProMax, is considered non-mobile in soils and sediments because it rapidly and strongly adheres to soil particles and degrades in the soil. 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. Because glyphosate is so tightly bound to the soil, little is transferred by rain or irrigation water. One estimate showed less than 2% of the applied chemical was lost to runoff (USFS 1984). The herbicide could move when attached to soil particles in erosion runoff. This is unlikely at Hopper Mountain NWR because the herbicide would be used primarily around structures that are on level ground where the risk of erosion runoff is quite low. In soils, glyphosate readily decomposes through microbiological degradation and is relatively non-persistent in soils with a half-life of less than 60 days (Cornell University 2012). Glyphosate is practically non-toxic to soil invertebrates (earthworm [*Eisenia foetida*] LC50 > 10,000 mg/kg dry soil) and is broken down naturally by microorganisms (Monsanto 2008). Thus, application of glyphosate is considered to have only a minor adverse effect on soils in the short term.

Through the IPM process, chemical means for controlling pests are minimized in favor of other non-chemical strategies. When chemicals are used, the Service would follow standard BMPs, including adherence to all EPA and California EPA warning labels and application requirements, as well as the Service's Pesticide Use Proposal (PUP) process regulations. This highly regulated and integrated process carefully considers the environmental hazards, efficacy, costs, and vulnerability of the pesticide being used. Given this process and their limited use, the Service concludes that pesticides would have a minor adverse effect on soils, while providing a net beneficial effect to biological resources as noted in the sections to follow.

Additionally, potential effects to the biological and physical environment associated with the proposed site-, time-, and target-specific use of pesticides PUPs on the refuge would be evaluated using scientific

information and analyses in this chapter. PUPs (including appropriate BMPs) would be approved where scientific evidence indicates that effects to refuge biological resources and its physical environment are likely to be minor, temporary, or localized in nature. Along with the selective use of pesticides, PUPs would also describe other appropriate IPM strategies (biological, physical, mechanical, and cultural methods) to eradicate, control, or contain pest species in order to achieve resource management objectives.

The effects of non-pesticide IPM strategies to address pest species on the refuge would be similar to those effects described elsewhere within this chapter, where they are discussed specifically as habitat management techniques to achieve resource management objectives on the refuge. For example, the effects of grazing to control invasive plants in an improved pasture would be similar to those effects summarized for mowing, where it would be specifically used to provide short grass foraging habitat for wildlife.

Based on scientific information and analyses in this chapter, pesticides allowed for use on the refuge would be of relatively low risk to non-target organisms as a result of low toxicity or short persistence in the environment. Thus, potential impacts to refuge resources and neighboring natural resources from pesticide applications would be expected to be minor, temporary, or localized in nature.

4.1.1.2 Alternative B – Preferred Alternative

Implementing Alternative B would have a minor adverse effect on soils and no adverse effects on geologic resources. Under Alternative B, more intensive habitat management (e.g., prescribed grazing) and invasive species control measures would be implemented as compared to Alternative A (as further discussed in section 4.1.5), along with small construction and restoration projects to support California condor management (e.g., facility construction and restoration projects) and riparian restoration projects. Prescribed grazing can result in compaction of soils and formation of terracette (micro-formation of step like structures prone to erosion) resulting in increased surface water runoff and erosion, as well as exposing soils from trampling and vegetation removal (Butler 1995, Blackburn 1975, Gifford and Hawkins 1978, Higgins 1982, Roberson 1996, and Trimble and Mendel 1995). Additional construction activities covering less than 0.25 acres would occur from replacement of obsolete housings with Service-approved living quarters. Construction activities to replace housing and modify man-made wetlands can cause soil erosion while excavating and grading the sites. Soil erosion would be minimal given that the sites are relatively level, were previously disturbed, and BMPs would be implemented as outlined in Appendix 1 of the EA. In any event, these activities would slightly increase the potential for short-term, localized exposure of bare soils resulting in increased water and wind erosion as compared to Alternative A. Implementation of BMPs (see Appendix 1 of the EA) would minimize loss of soils during soil disturbing activities. Overall, there would be minor, short-term adverse impacts to soils and no adverse effects on geologic resources from implementing Alternative B relative to Alternative A.

4.1.1.3 Alternative C

Under Alternative C, similar minor adverse effects to soils previously described for Alternative B would occur from implementing habitat management measures and the IPM Plan. Under this alternative, the IPM would not include the use of chemical methods for controlling non-native species, invasive species, and noxious weeds, which would reduce some of the minor adverse effects to soils. In addition to the housing improvements described in Alternative B, 2 additional RV hookups would be installed under Alternative C to increase housing capacity from 16 to 20 people, but soil disturbance would be negligible because the hookups would be installed on level ground in a developed area. In the southern California black walnut and oak woodland communities, proposed habitat management measures under Alternative C would create additional fire breaks across approximately 3.6 acres of additional land. Fire breaks are spread throughout the refuge, generally around structures and the refuge boundary. These measures would have short-term adverse impacts to soils from vegetation clearing activities but long-term indirect positive impacts from minimizing the potential for more severe wildfires in the future. Overall, there would be minor, short-term, localized adverse impacts to soils from implementing Alternatives C relative to Alternative A. In general, Alternative C would result in slightly more adverse effects to soils as compared

to Alternative B due to the additional ground disturbing activity across approximately 3.6 acres of land.

4.1.2 Air Quality – Hopper Mountain NWR

Hopper Mountain NWR is located in Ventura County, California, which is within the South Central Coast Air Basin and is regulated by the Ventura County Air Pollution Control District. This basin is in nonattainment status for ground-level ozone and particulate matter less than 10 microns in diameter (PM₁₀).

4.1.2.1 Alternative A – No Action

Minor adverse impacts to air quality would remain the same under Alternative A. Hopper Mountain NWR is in a fire-prone environment that has burned several times in the past decades due to wildfires. Reduction of fuels and vegetation clearing associated with fire break maintenance within the southern California black walnut and oak woodlands, facilities protection, and trail access for condor management activities generate brush piles which, in certain years, are burned when permitted by and in coordination with the Ventura County Air Pollution Control District and in accordance with permit requirements. Limited pile burning would continue to reduce hazardous fuels and burn vegetation cleared for fire break and trail maintenance, and to protect facilities from wildfires. When pile burning is not permitted (as has been the case in the past years), brush piles are chipped and mulched. When burning is permitted, such activities can generate fine particulates and contribute to regional emissions of PM₁₀. Other refuge activities that generate PM₁₀, ozone precursors (reactive organic gasses [ROG] and nitrogen oxides [NO_x]), and carbon include vehicle use associated with visitation and heavy equipment use (e.g., tractor emissions) from the combustion of fossil fuels. Activities that disturb and expose the soil, such as mowing, disking, grading (road maintenance), vegetation clearing, and other activities, can also generate increased particulate emissions, particularly during windy conditions.

Emissions of particulates from smoke associated with these activities would generate minor, localized adverse impacts to air quality. However, such emissions would be temporary and would result in minor adverse effects to regional air quality, as pile burning activities would be conducted in accordance with Ventura County Air Pollution Control District burn permits, with predetermined prescription levels, and in close coordination with this agency to minimize effects in consideration of timing, prescription levels, wind direction, and distance from receptors. Dust control measures would also be implemented to minimize emissions associated with fuel loads reduction and mowing. Emissions associated with vehicle trips and equipment usage would be minor given the level of activity at the refuge relative to current emissions within the South Central Coast Air Basin associated with regional traffic and equipment usage. Thus, air emissions for activities under Alternative A are considered minor.

4.1.2.2 Alternatives B

Implementing Alternatives B would result in minor adverse effects to air quality. As part of this alternative, enhanced habitat management (e.g., grassland habitat management program involving over 600 acres) and invasive species control would involve a range of management measures to include prescribed burning, prescribed grazing, disking, and mowing. Prescribed burning activities may increase PM₁₀ and carbon emissions relative to Alternative A, but such effects would be minor because: 1) the Service would develop a prescribed burning plan as part of the grassland Habitat Management Plan (HMP) and obtain and adhere to the requirements of a burning permit issued by the Ventura County Air Pollution Control District; 2) effects would be avoided and minimized by coordinating activities with the district, implementing burn prescriptions and cessation requirements based on predetermined levels established by the district, and use of fire breaks around burning units to prevent wildfires; and 3) effects would be mitigated through small unit sizes, wind direction considerations, and distance to receptors. In addition, increased habitat management (clearing, disking, mowing), construction (replacement of obsolete housing), and visitor and volunteer activities under Alternative B would result in increased use of vehicles (e.g., on-road cars and trucks, and off-road all-terrain vehicles [ATVs]) and equipment, which would result in very minor and temporary increases in PM₁₀, ROG, NO_x, and carbon emissions relative to Alternative A. On the other hand, Alternative B would include additional carbon emission reduction measures and other “green” activities to reduce the carbon footprint emissions of refuge activities, as well

as ROG and NO_x emissions from reduced vehicle trips, including optimizing energy efficiency programs by following Green Building Council's LEED standards. Implementing these measures would help the Service meet its Climate Change policy objectives for reducing refuge staff carbon footprints. Overall, the Service plans to reduce the carbon footprint by 5%-10% annually and become carbon neutral by 2020. In total, the overall net effect on air emissions from all activities under Alternative B (e.g., prescribed burning, more intense habitat management, and vehicle emissions [visitors, volunteers, and workers]) would result in a minor adverse impact to air quality relative to current management activities and visitor access under Alternative A, given the adoption of BMPs previously discussed (see EA Appendix 1).

4.1.2.3 Alternative C

Implementing Alternative C would result in minor adverse effects to air quality. Under Alternative C, similar minor adverse effects to air quality previously described for Alternative B would occur from implementing habitat management measures and the IPM Plan. However, Alternative C would not include carbon emission reduction measures and other "green" activities to reduce the carbon footprint of the refuge activities. Additional vegetation clearing in walnut stands to create 3 miles of additional fire breaks would generate 1 additional pile of brush per year (8 feet high and 20 square feet at its base), which may be burned if permitted by regulators, thereby generating additional particulate and carbon emissions. If burning is not permitted by regulators in that particular year, then brush would be chipped and mulched. There would also be added volunteer activities under Alternative C (relative to Alternatives A and B), which would increase PM₁₀, ROG, NO_x, and carbon emissions. The overall net effect on air emissions from all activities under Alternative C (e.g., additional prescribed burning, more intense habitat management, and vehicle emissions [visitors, volunteers, and workers]) would result in a minor adverse impact to air quality relative to current management activities and visitor access under Alternative A.

4.1.3 Noise – Hopper Mountain NWR

4.1.3.1 Alternative A – No Action

There would be a minor adverse effect of current activities under Alternative A on noise levels in the vicinity of Hopper Mountain NWR. The general public in the vicinity of Hopper Mountain NWR may experience minor changes in noise due to activities associated with management actions at the refuge, including: use of vehicles for refuge access associated with condor and habitat management activities by refuge personnel and contractors (e.g., on-road cars and trucks, and off-road ATVs), vehicle use for limited visitor and volunteer access, and trucks and other vehicle access for oil and gas extraction activities. Given the refuge's remote location and restricted access, only minor changes in traffic related noise would occur. Furthermore, these noise effects are similar to levels experienced by these residents from other traffic along these access roads. Sensitive receptors (e.g., schools, churches, clinics, and assisted living facilities) and residences located along major access routes to the refuge (e.g., access through Fillmore, California) would not experience any appreciable differences in traffic related noise levels, given that the refuge is closed to the general public.

4.1.3.2 Alternative B

Increased management and visitor activities under Alternative B would result in limited increases in local traffic, which would result in very minor increases in noise levels during certain time periods for a short duration for receptors residing near access roads to the Hopper Mountain NWR. This change in noise for Alternative B would be negligible relative to current management activities and visitor access under Alternative A.

4.1.3.3 Alternative C

Increased management and visitor activities under Alternative C would result in limited increases in local traffic, which would result in minor increases in noise levels during certain time periods for a short duration for receptors residing near access roads to the Hopper Mountain NWR. Under Alternative C, similar minor adverse effects to noise levels previously described for Alternative B would occur, although slightly greater traffic may occur from enhanced volunteer and outreach efforts. In any event, given the

remote location and limited public access, only minor changes in traffic related noise would occur relative to the current management activities and visitor access under Alternative A.

4.1.4 Water – Hopper Mountain NWR

4.1.4.1 Alternative A – No Action

Continuation of current refuge management practices would have no impact on hydrology and only short-term, localized minor adverse effects on water quality from increased turbidity during soil disturbing activities. There would be no change in the overall extent of vegetation cover and water management, thus there would be no change in hydrology from continuation of current management measures. Maintenance activities would continue under Alternative A to include road maintenance and limited vegetation clearing, thinning, mowing, and disking for reducing fuel loads, maintaining fire breaks, invasive species removal, and trail maintenance. Such actions would temporarily expose soils, resulting in increases in soil erosion, runoff, and localized increases in turbidity levels. In addition, vehicle access and heavy equipment usage (including vehicle and equipment access to oil and gas operations) may increase the potential for small releases of oils, grease, and other petroleum products. Soil erosion control measures, avoidance of riparian and wetland habitat, adherence to Service regulations and policy, and BMPs discussed in Appendix 1 of the EA would reduce potential effects to water quality, resulting in only short-term minor adverse effects to water quality. In accordance with the Service Manual 612 FW 2, Oil and Gas, section 2.4, the Service would also continue to maximize protection of water resources, while entities exercise non-federal oil and gas rights. Operators are required to clean or correct spills of oil or other contaminants in accordance with EPA's Spill Contingency Plan, as well as report any releases to the Service within 48 hours. Additionally, the Service's Pacific Southwest Region's Oil and Hazardous Materials Contingency Plan identifies procedures for trained Service employees to respond to oil spills that affect Refuge lands and trust resources. As such, only minor adverse effects to water quality would occur as a result of implementing such actions.

As previously discussed, Service-approved herbicides/pesticides (e.g., Roundup or other similar herbicides for vegetation control) would be used as part of an IPM plan for controlling pests. Pesticides used at Hopper Mountain include the herbicide glyphosate (Roundup ProMax or other similar herbicide) on up to 30 acres (10 acres of grass and weeds around structures and 20 acres of fields in February and March). As discussed in the Soil section, glyphosate is highly adsorbed on most soils, so that little will leach from the applied area. 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). In accordance with BMPs (see Appendix 1 of the EA), the Service would maintain unsprayed buffer areas near aquatic habitats and other sensitive areas to protect water quality. In addition, the Service would avoid application of pesticides where seasonal precipitation or excess irrigation water is likely to wash residual toxic substances into waterways. Furthermore, herbicide/pesticide treatments for the control or removal of invasive plants in riparian/wetland areas must be limited to hand or wick applications by qualified personnel. All chemicals would be handled in strict accordance with label specifications and applied in consideration of persistence, soil/water mobility, toxicity, and plant update. The Service would also adhere to all EPA and California EPA warning labels and application requirements, as well as the Service's PUP process regulations. This highly regulated and integrated process carefully considers the environmental hazards, efficacy, costs, and vulnerability of the pesticide being used. Given this process and their limited use, the Service concludes that the use of pesticides would have a negligible adverse effect on water quality, while providing a net beneficial effect to biological resources as noted in the sections to follow.

4.1.4.2 Alternative B – Preferred Alternative

Implementing Alternative B would have a short-term, minor adverse effect on water quality and a long-term, minor positive effect on hydrology and water quality. Under Alternative B, more intensive habitat management (e.g., prescribed grazing) and invasive species control measures would be implemented (as further discussed in section 4.1.5), along with small construction and restoration projects (less than 0.25 acre in size cumulatively) to support condor management and riparian management, and road

maintenance (e.g., reducing erosion problems and improving hydrology). These activities would increase the potential for short-term, localized exposure of bare soils resulting in increased soil erosion, runoff, and turbidity in receiving water bodies. Implementation of BMPs outlined in Appendix 1 of the EA and adaptive management would reduce these adverse effects to water quality, including installation of exclusionary fencing to prevent livestock from entering riparian and wetland areas, resulting in only minor adverse effects. On the other hand, upgrading the existing water control structure for the purpose of meeting wetland objectives, reducing road erosion problems, and mechanically modifying wetland substrate to achieve a desirable ratio of open water to emergent marsh vegetation would result in long-term positive effects on hydrology and water quality. In addition, riparian and wetland habitat management and restoration would increase the filtering capacity of this habitat, thereby resulting in additional long-term improvements in water quality. With respect to oil and gas operations and other activities, the Service plans to conduct scheduled water quality testing for contaminants during regular flows and storm events to ensure that water quality is being maintained at the refuge. In addition, the Service would conduct regular facility inspections, surface management of operations, and evaluation of BMP implementation, in coordination with technical assistance provided by the Bureau of Land Management (BLM). Overall, there would be minor, short-term adverse impacts to water quality and positive long-term impacts to both water quality and hydrology from implementing Alternative B relative to Alternative A.

4.1.4.3 Alternative C

Under Alternative C, similar minor adverse and positive effects to water quality and hydrology previously described for Alternative B would occur from implementing Alternative C. Under this alternative, the Service would not include the use of chemical methods to control non-native species, invasive species, and noxious weeds, which would reduce some of the minor adverse effects to water quality. Furthermore, the Service would not implement baseline monitoring, water quality testing, enhanced coordination with upstream oil and gas operators, and enhanced road maintenance activities as proposed for Alternative B. In the southern California black walnut and oak woodland communities, proposed habitat management measures under Alternative C would create additional fire breaks (approximately 3.6 acres), which would increase the potential for soil erosion. Additional construction activities and creation of additional fire breaks under Alternative C would increase the potential for erosion and turbidity concerns, but impacts would be minimal given implementation of BMPs as outlined in Appendix 1 of the EA. Overall, there would be minor, short-term adverse impacts to water quality and positive long-term impacts to both water quality and hydrology from implementing Alternative C relative to Alternative A. In general, Alternative C would result in slightly greater effects to water quality and hydrology as compared to Alternative B due to the added scope of habitat and riparian restoration efforts and the reduced use of pesticides.

Effects on the Hopper Mountain NWR Biological Environment

4.1.5 Vegetation – Hopper Mountain NWR

4.1.5.1 Common to All Alternatives

Hemp dogbane is a culturally important plant to Native Americans. Hemp dogbane is used for artistic and ceremonial purposes. Under each alternative, collection of hemp dogbane would be conducted each year, typically by a group of 4 people. Approximately 1 cubic yard of plant material would be collected as cuttings from existing plants, which would not kill the plants. Given the size of the cuttings (from less than 1% of the hemp dogbane on the refuge) and adherence to Special Use Permit (SUP) conditions, continued collection of this volume of hemp dogbane would have only a short-term, minor adverse impact on the plants, and no long-term adverse effects to the species, population, or other biological resources. Hemp dogbane is adapted to a range of fire regimes, but research on its response to fire has shown conflicting results (Reeves 2006).

4.1.5.2 Alternative A – No Action

Overall, there would be no appreciable impact to native plant species and communities from continuation of current management activities under Alternative A, given the limited habitat management that occurs

at Hopper Mountain NWR other than for supporting the California condor recovery effort. Limited vegetation clearing, mowing, and disking would continue across less than 10 acres of the refuge for reducing fuel loads, maintaining fire breaks in the southern California black walnut and oak woodland areas, riparian management (e.g., periwinkle removal), and road/trail maintenance. Such actions would prevent re-growth of vegetation in these areas; however, there would be no change in the plant communities or extent of vegetation cover that currently exists and likely no increase in extent of native plant species and communities. Since Hopper Mountain NWR is in a fire-prone environment that has burned several times in past decades, such fire control measures may provide a long-term positive benefit by reducing the potential for more severe wildfires (e.g., stand-replacement fires) in the future, which could ultimately damage vegetation more severely if fuel reductions did not occur (stand-replacement fires may result in replacement of the dominant vegetation species, reduction in above ground vegetation biomass, and reduction in vegetation biodiversity) (Telfer 2000).

4.1.5.3 Alternative B – Preferred Alternative

Implementing Alternative B would have minor positive and negative effects on native plant species and communities, with the potential for localized moderate positive and negative effects. Under Alternative B, a step-down grassland HMP would be implemented with the goal of protecting and enhancing over 600 acres of grasslands, using a range of management measures to include prescribed burning, prescribed grazing, disking, and mowing for habitat management and invasive species control. The plan would seek to create a mosaic of grassland types, with the goal of improving habitat conditions for special status wildlife species.

Prescribed burning for habitat management at Hopper Mountain NWR would result in both short-term adverse effects and net long-term positive effects contributing to maintaining native plant species and biodiversity (Telfer 2000). Although prescribed burning would burn a portion of the live vegetation biomass along with dead biomass in the short term, prescribed burning can reduce the potential for more severe stand-replacing fires in the future, thereby maintaining ecosystem function in the long term across the landscape (Telfer 2000). In addition, research has shown that habitat in the region is well adapted to such fire treatment methods, as many plants germinate when exposed to such heat and wildlife quickly recolonize treated areas (Telfer 2000). Following prescribed burning, forbs and grasses have been shown to increase in abundance (Telfer 2000). California walnut groves, dominated by southern California black walnut, as well as woodlands dominated by live oak (*Quercus agrifolia*), are adapted to low intensity wildfires and recover rapidly through shoots from the trunk and root crowns (Esser 1993). Other tree species, such as bigleaf maple (*Acer macrophyllum*), cottonwoods (e.g., Fremont cottonwood [*Populus fremontii*]), and sycamores (e.g., California sycamore [*Platanus racemosa*]), which have relatively thin bark, may sustain more fire damage from prescribed fire treatment (Fryer 2011, Taylor 2000). Although these species are relatively easily damaged, they will typically recover with vigorous resprouting if injured or top-killed, especially bigleaf maple and sycamore (Davis et al. 1989). In grassland habitat, prescribed fire treatments have been shown to decrease the dominance of non-native grasses, while it increased the diversity and dominance of native and non-native forbs (Parsons and Stohlgren 1989). Although grassland habitat diversity may benefit from prescribed fires, coastal sage and sagebrush vegetation and chamise chaparral (dominated by chamise [*Adenostoma fasciculatum*]) may be adversely impacted by prescribed burning, resulting in mortality of sage and sagebrush vegetation (McMurray 1990). Avoiding coastal sage scrub habitat and establishing sufficient buffers in consideration of climatic conditions would mitigate adverse impacts to this sensitive plant community.

Prescribed grazing (e.g., using sheep or cattle) would be utilized as one of many habitat management techniques to potentially achieve mosaic grassland objectives. In addition, prescribed grazing may help reduce fuel loads and suppress fire risks in areas where grazing reduces residual dry matter (RDM) below 600 lbs/acre (Stahlheber and D'Antonio 2013, Meyer and Schiffman 1999). Although prescribed grazing would provide long-term benefits as an important tool for restoring short grass and mosaic grassland habitat types, this strategy can generate both beneficial and adverse effects to native plants and plant communities (see section 4.1.7 for discussion of rare plants and special status species). Results of scientific studies on the effects of grazing has shown that successful results are very site-specific and can

depend on the interaction between site conditions (e.g., soil type), weather, and grazing practices (Briske et al. 2011, Kimball and Schiffman 2003, Stahlheber and D'Antonio 2013, Huntsinger et al. 2007). Such site-specific studies are lacking in the study area relative to the type of prescribed grazing being proposed; therefore, there is a degree of uncertainty as to what effect prescribed grazing would have on specific plants and vegetation in the area. As such, the Service has adopted an adaptive management approach, with monitoring (RDM and refuge resource targets), to evaluate the effects of prescribed grazing on vegetation for each management unit (and other resources as further described below), which will allow for adjustments to be made in grazing permits to mitigate adverse effects (e.g., stipulations related to timing, stocking density, type, access, maintenance, reporting, supplemental feeding, support equipment usage, livestock quarantine and origin restrictions [to reduce invasive species risk from livestock and vehicles used to transport livestock], and monitoring) (Bush 2006, Herrick et al. 2012). Such adverse effects would be mitigated by limiting grazing to specific resource prescriptions, grazing permit restrictions, and other adaptive management techniques based on monitoring both residual dry matter and refuge resource targets. Such methods have been used successfully to manage grazing intensity and distribution, as well as for determining carrying capacity (Bartolome et al. 2006, McDougald et al. 1991). Overall, habitat manipulation through prescribed grazing would likely have adverse effects on certain species or groups, while simultaneously providing some beneficial effects to other species or groups. Thus, the effects depend on the frame of reference and would be highly site-specific (Jackson and Bartolome 2007). Cattle are generalist herbivores that prefer grasses of the California annual-type grassland (Van Dyne and Heady 1965), and certain forbs and legumes may benefit from reduction of non-native annual grass biomass, including standing dead plant material and thatch (Huenneke et al. 1990).

Potential adverse effects of grazing on grasslands and riparian areas include: proliferation of non-native and invasive species; trampling sensitive species; trampling of vegetation; trench creation; wallowing during resting; habitat fragmentation; creating gaps for invasive species; overgrazing; habitat fragmentation; soil disturbance (compaction, disruption of soil crusts, and exposure to erosion); reduction in soil mycorrhizae; preferential grazing of perennials over annuals; adverse effects from feces that can smother plants; and riparian damage (as cited in Anderson et al. 1984; Lacey 1987; Schiffman 1997; Belnap et al. 2001; Belsky and Gelbard 2000; Jones 2001; CalPIF 2000; Ellison 1960; Holland and Keil 1995; Krueper 1993; Taylor and Davilla 1986; USFWS 1998; Van Dyne and Heady 1965). These adverse effects may be partially mitigated through implementing monitoring and adaptive management measures and mitigation measures (e.g., erecting temporary electric exclusionary fences [e.g., to prevent riparian, wetlands, and shrub habitat damage], adherence to restrictions and permit conditions outlined in SUPs (e.g., livestock quarantines and location restrictions to reduce the risk of introducing invasive species from livestock and vehicles used to transport livestock [Bush 2006], monitoring to reduce the potential for overgrazing effects, controlled access) (see Appendix C of the CCP for list of grazing restrictions) or other agreements. The grassland HMP would utilize adaptive management (considering the potential effects of climate change), research, monitoring, and grassland restoration techniques to ensure that all management regimes achieve intended goals and objectives for grassland habitat. This effort would be enhanced through additional research, inventorying, and monitoring, as included in Alternative B.

As part of an IPM Plan for Hopper Mountain NWR, early detection monitoring and biological, chemical, and targeted mechanical management measures (that may include prescribed grazing and prescribed burning) would be employed to control non-native, invasive species, and noxious weeds in existing grasslands, riparian, and wetlands in targeted areas, which may result in positive impacts to habitat quality. The objective of the Service is to reduce by 50% or extirpate targeted non-native invasive species on the refuge during the next 12 years. In addition, the Service plans to reduce by 80% invasive non-native species, including rabbit-foot grass (*Polypogon monspeliensis*), and vinca (*Vinca major*). Native vegetation plantings in riparian and wetlands would occur, which would improve habitat quality and resilience to non-native species invasions. Although certain management measures may have localized, short-term minor adverse impacts on certain plant communities (e.g., restoration, fuel reduction, herbicide usage, minor construction projects [less than 0.25 acres of vegetation removed for facility construction], and facility restoration efforts), the goal of this effort is to generate long-term benefits to habitat

productivity and biodiversity, which will be evaluated through monitoring and an adaptive management process. With respect to herbicide applications, direct application of Roundup ProMax to vegetation would have adverse effects to sensitive vegetation within treated areas. Modeling and risk assessment studies have shown that indirect exposure (e.g., spray drift) using this herbicide would not be a concern to non-target vegetation beyond a 25 to 100 foot buffer depending on the application rate and weather conditions (USFS 2011a). Applying this herbicide in accordance with label instructions during calm weather periods with low potential for drift with sufficient buffer distances based on the selected application rate would reduce adverse effects to non-target species outside of the application area (USFS 2011a). Minor positive indirect effects may also occur from road maintenance and runoff control measures to prevent severe erosion and head-cutting in riparian areas. Both minor adverse and positive impacts would occur to certain man-made wetland communities from modifying wetland hydrology and replacing culverts with new water control structures. In the southern California black walnut and oak woodland communities, proposed habitat management measures under Alternative B would improve the quality of 189 acres of habitat by restoring more natural age-class distributions, improving regeneration, and adaptively managing stands to adapt to the effects of climate change. Browse protection devices would also be installed to reduce adverse effects to southern California black walnut habitat from grazing. Expanded volunteer programs (e.g., plant propagation, plantings, invasive species removal, and plant surveys) and outreach (e.g., development of riparian BMPs in coordination with oil and gas firms) would provide additional positive benefits and help the Service in achieving management goals for improving and conserving plant communities.

There is uncertainty as to the net effect on vegetation from all management activities under Alternatives B given the lack of scientific research at Hopper Mountain NWR. Although certain management measures may have localized, short-term minor adverse impacts on certain plant communities and non-target species as noted (e.g., prescribed grazing, clearing, disking, and herbicide treatment), it is hypothesized that there would be long-term benefits in habitat productivity and biodiversity resulting in net positive effects to native plants and plant communities, but further research and monitoring are needed to evaluate these net effects. Overall, impacts would range from minor to moderate, with both positive and negative effects relative to Alternative A. Given this uncertainty, effects to vegetation will be managed through an adaptive management process to mitigate adverse impacts.

4.1.5.4 Alternative C

Implementing Alternative C would also have minor positive and negative effects on native plant species and plant communities, with the potential for localized moderate positive and negative effects. Under Alternative C, similar effects to native plant species and communities previously described for Alternative B would occur through implementation of a step-down grassland HMP and IPM Plan. Under this alternative, the IPM would not include the use of chemical methods for controlling non-native species, invasive species, and noxious weeds, which would reduce the effectiveness of the program for achieving management goals relative to controlling invasive species. As a result, there is uncertainty as to whether the Service would be able to meet its goals and objectives for control of invasive species. As part of an adaptive management strategy under Alternative C, additional support research would be conducted to identify methods and control invasive plant species, without the use of chemical treatment. In addition, Alternative C would include additional monitoring and management of riparian areas, as compared to Alternative B, which would generate additional positive benefits in the long term. In the southern California black walnut and oak woodland communities, proposed habitat management measures under Alternative C would create additional fire breaks, which would have short-term adverse impacts to vegetation from clearing activities across 3.6 acres, but long-term positive impacts from minimizing the potential for future stand-replacement wildfires (Telfer 2000). Alternative C also includes additional management measures for potentially controlling weeds and invasive grasses through prescribed grazing using an adaptive management approach, and research relative to invasive species control to promote habitat quality in the southern California black walnut and oak woodland community. Tree shelters will be used to reduce impacts to woodland trees from ungulates (McCreary and George 2005). In addition, exclusionary fencing will be used to mitigate adverse effects of prescribed grazing on woodland communities. Although research efforts have the potential to provide some positive benefits by improving

management decisions, certain projects may have short-term, localized, minor adverse effects (e.g., vegetation removal, human activity, soil disturbance), which would be controlled and monitored as part of a SUP with specified permit conditions and enforcement to minimize effects. Alternative C also includes additional construction activities, such as replacement of obsolete housings with more Service-approved living quarters. Construction impacts, however, would be minimal given that the site was previously disturbed.

As previously discussed, there is uncertainty as to the net effect on vegetation from all management activities under Alternatives C given the lack of scientific research at Hopper Mountain NWR. In general, Alternative C may afford more benefits to the southern California black walnut and oak woodland communities and riparian communities if invasive species can be adequately controlled through non-chemical treatment strategies (which is an area of uncertainty), with fewer benefits to the grassland as compared to Alternative B; but further research is needed. Overall, impacts would range from minor to moderate, with both positive and negative effects relative to Alternative A.

4.1.6 Wildlife Resources – Hopper Mountain NWR

4.1.6.1 Alternative A – No Action

Given the limited vegetation management that occurs at Hopper Mountain NWR, current management (Alternative A) would continue to provide moderate to low quality grassland habitat, and moderate quality woodland and riparian habitat for a variety of migratory and resident wildlife. Limited habitat management to control fuel loads near roads and facilities would maintain current habitat conditions for wildlife. Since Hopper Mountain NWR is in a fire-prone environment that has burned several times in past decades, such fire control measures may provide long-term positive benefits to wildlife by reducing the potential for more severe wildfires (e.g., stand-replacement fires) in the future. Severe stand replacement fires can eliminate important habitat for many species of birds and small mammals, expose wildlife to predators, and reduce browsing opportunities for some wildlife species for many years (CalPIF 2000; CalPIF 2002a; CalPIF 2004; Lyon et al. 2000a,b). Although severe wildfires may eliminate habitat for some species, they can create habitat for others.

4.1.6.2 Alternative B – Preferred Alternative

Implementing Alternative B would have a long-term, moderate positive effect on a diversity of wildlife resources. Under Alternative B, several measures would be implemented to improve and restore habitat quality benefiting an array of wildlife at Hopper Mountain NWR, including: a step-down grassland HMP; monitoring program; additional staffing; research (with associated SUPs to minimize any short-term effects); and expanded IPM management. Enhanced habitat management and monitoring efforts would benefit many species of wildlife that utilize grassland (short grass, mosaic), riparian, wetland, and black walnut and oak woodland habitat, including many species of migratory birds (CalPIF 2000; CalPIF 2002a; CalPIF 2004; Riparian Habitat Joint Venture [RHJV] 2000; Siegel and DeSante 1999). Implementing the grassland HMP would restore and maintain a mosaic of grassland heights across 420 acres, which would provide benefits to a range of special status species and Partners in Flight focal bird species (Fuhlendorf et al. 2006; Shuford and Gardali 2008) as outlined in Partners in Flight Bird Conservation Plans (CalPIF 2000; CalPIF 2002a; CalPIF 2004; RHJV 2000; Siegel and DeSante 1999). For example, taller grasses may support northern harrier (*Circus cyaneus*) (MacWhirter and Bildstein 1996) and grasshopper sparrow (*Ammodramus savannarum*) (CalPIF 2000), medium grass heights may support the short-eared owl (*Asio flammeus*) (Wiggins et al. 2006), and the short grasses may support western burrowing owl (Green and Anthony 1989; Haug et al. 1993) and prairie falcon (*Falco mexicanus*) (Steenhof 1998). In addition, many Neotropical songbirds may benefit, including wintering Oregon vesper sparrows (*Pooecetes gramineus*), as well as the coast patch-nosed snake and San Diego desert woodrat. Wildlife species that may benefit from wetlands and riparian habitat management and restoration efforts include warbling vireo (*Vireo gilvus*), Swainson's thrush (*Catharus ustulatus*), yellow warbler (*Dendroica aestiva*), common yellowthroat (*Geothlypis trichas*), Wilson's warbler (*Wilsonia pusilla*), song sparrow (*Melospiza melodia*), black-headed grosbeak (*Pheucticus melanocephalus*), Sora (*Porzana carolina*), and Virginia rail (*Rallus limicola*) (RHJV 2000). In the black walnut and oak

woodlands, habitat restoration efforts may benefit Nuttall's woodpecker (*Picoides nuttallii*), acorn woodpecker (*Melanerpes formicivorus*), oak titmouse (*Baeolophus inornatus*), Hutton's vireo (*Vireo huttoni*), and ash-throated flycatcher (*Myiarchus cinerascens*) (CalPIF 2002a). Although many habitat management measures would result in short-term, minor adverse impacts and localized disturbances from human activity, in the long-term, these measures may provide net positive effects for many species of wildlife that utilize grassland (short grass, mosaic), riparian, wetland, and woodland habitat, including many species of migratory birds (CalPIF 2000; CalPIF 2002a; CalPIF 2004; RHJV 2000; Siegel and DeSante 1999). Monitoring and adaptive management strategies would be utilized to determine whether these habitat measures benefit targeted wildlife species as planned, with adjustments made as necessary to enhance effectiveness and minimize adverse effects.

Expanded habitat management, inventory and monitoring (I&M) measures, and fencing replacement with wildlife-friendly fencing may benefit ungulates such as mule deer (*Odocoileus hemionus*), which would provide additional forage for condors. For example, non-barbed wire fencing would be used for the top and bottom wires of the fence in order to protect small mammals and ungulates that may move over or under the fence (Gross et al. 1983, Gates et al. 2011). Replacement of old fencing may enhance movement of elk and antelope across the landscape. Grassland habitat management measures (e.g., prescribed burning) may also improve habitat and foraging opportunities in the long-term for ungulates on the refuge, which also have been shown to avoid direct short-term adverse impacts from prescribed fire treatments (Lyon et al. 2000a,b; Snyder 1991a,b).

Prescribed grazing may have both beneficial and adverse, and minor and moderate effects to wildlife of Hopper Mountain NWR. Potential adverse effects of grazing on wildlife habitat include: proliferation of non-native and invasive species; trampling of vegetation; trench creation; wallowing during resting; habitat fragmentation; creating gaps for invasive species; overgrazing; habitat fragmentation; soil disturbance (collapsing burrows, compaction, disruption of soil crusts, and exposure to erosion); reduction in soil mycorrhizae; preferential grazing of perennials over annuals; potential adverse effects on ungulate populations; and riparian damage (as cited in Lacey 1987; Schiffman 1997; Belnap et al. 2001; Belsky and Gelbard 2000; Gogan and Barrett 1987; Jones 2001; CalPIF 2000; Ellison 1960; Holland and Keil 1995; Kie et al., 1991; Krueper 1993; Loft et al. 1991; Stewart et al. 2002; Taylor and Davilla 1986; USFWS 1998; Van Dyne and Heady 1965, Zambrano 1998). Prescribed grazing also has the potential to adversely affect ground-nesting birds and habitat quality (CalPIF 2000; Holland and Keil 1995; Krueper 1993; Taylor and Davilla 1986; USFWS 1998). The Service would apply an adaptive management approach and I&M (e.g., breeding bird surveys, point count stations, raptor observations, and periodic survey routes for migratory birds, and small mammal trapping for small mammals) to evaluate the long-term effects of habitat changes and prescriptions (e.g., prescribed grazing) to ensure that the refuge goals and objectives are achieved, maximizing benefits for native wildlife species and special status species (when present), as discussed in section 4.1.7. With respect to expanded IPM measures, application of Roundup ProMax does not pose a concern for wildlife based on a range of application and dose response scenarios tested by the U.S. Forest Service (USFS 2011a).

Overall, habitat management measures may result in minor adverse effects for certain species that favor current conditions. Generally, beneficial effects would occur to species favoring open, short grass habitat, while negative effects may occur to species favoring denser vegetation and taller grasses. In addition, many habitat restoration and management measures would cause temporary, localized, minor adverse effects to wildlife as a result of vegetation removal, soil disturbance, and human activity. To the extent feasible, the Service would mitigate adverse effects through avoiding sensitive areas, adjusting the timing of management activities, and other strategies. Although certain management measures may have localized, short-term minor adverse impacts on wildlife from habitat disturbance and human activities, the goal of this program is to enhance habitat productivity, wildlife population growth, and increased biodiversity, which will be tested through monitoring and an adaptive management process. The Service would apply an adaptive management approach and I&M to evaluate the long-term effects of habitat changes to ensure that the refuge goals and objectives are achieved, maximizing benefits for native wildlife species and special status species (when present), as discussed in section 4.1.7.

Long-term positive indirect effects may also occur for aquatic life and riparian species from road maintenance and runoff control measures to prevent severe erosion and head-cutting. Both minor adverse and positive impacts would occur to wildlife currently utilizing man-made wetland communities from modifying wetland hydrology and replacing culverts with new water control structures. In the short term, habitat disturbances from soil disturbing activities would have an adverse effect on wildlife and aquatic life. However, in the long term, partially restoring wetland hydrology would have a net benefit for many species of migratory birds, reptiles, amphibians, and mammals. Monitoring and adaptive management strategies would be utilized to determine whether these habitat measures benefit riparian and wetland communities as planned, with adjustments made as necessary to enhance effectiveness and minimize adverse effects.

Expanded volunteer programs would provide additional labor to assist the Service in achieving habitat and wildlife management goals, although short-term, localized minor disturbances to wildlife may occur from slight increases in visitor tours and volunteer efforts. Human activity during wildlife photography, observation, and volunteer activities has the potential to alter wildlife behavior (e.g., modify singing in birds, repeated flushing), increase energy expenditures, reduce reproductive success, alter distributions (sometimes away from higher quality habitat), reduce habitat quality, and serve as vectors of invasive species (Belanger and Bedard 1990; Dobb 1998; Glinski 1976; Gutzwiller et al. 1997; Klein 1993; Knight and Cole 1995; Miller et al. 1998; Morton 1995; Morton et al. 1989; Purdy et al. 1987; Smith and Hunt 1995). These effects would be minor, short-term and localized given that the refuge would remain closed with only limited guided tours (~ 4 per year) and adherence to restrictions for refuge access (e.g., access restricted to trails and designated areas and specific time periods, limits to group size [~20], tours guided by Service personnel, no dogs, avoidance of sensitive areas to minimize impacts to wildlife, [e.g., avoiding areas near condor nests sites, feeding stations, and trapping sites]).

Overall, the net effect on wildlife resources from all management activities under Alternatives B would result in net minor to moderate positive impacts to most targeted wildlife resources in the long-term relative to Alternative A, with the potential for some local minor to moderate adverse effects to other non-targeted wildlife species. Given the uncertainty associated with plan outcomes, wildlife impacts will be managed through an adaptive management process in order to mitigate adverse impacts.

4.1.6.3 Alternative C

Implementing Alternative C would also have a long-term, minor to moderate positive effect on targeted wildlife resources relative to Alternative A, with the potential for some local minor to moderate adverse effects to other non-targeted wildlife species. Under Alternative C, similar effects to wildlife resources previously described for Alternative B would be achieved through implementation of habitat management measures; IPM planning; and additional planning, research, and monitoring. Under Alternative C, no chemical methods would be used to control invasive species, which may reduce the effectiveness of restoration and habitat quality measures, thereby resulting in reduced positive effects to wildlife populations. Expanded volunteer programs proposed for Alternative C would also provide additional labor to assist the Service in achieving management goals for improving and conserving wildlife resources, although additional intrusion could increase the potential for wildlife disturbances. Alternative C would also increase monitoring and management efforts in the riparian and wetland habitat above levels specified for Alternative B, which may provide added benefits to wildlife species utilizing these areas. In addition, expanded fire breaks and intensive habitat management of the southern California black walnut and woodland habitat may provide long-term positive effects to wildlife species utilizing this habitat as compared to Alternative B. Overall, the net effect from all management activities under Alternatives C would result in minor to moderate positive impacts to most targeted wildlife resources relative to Alternative A, with the potential for some local minor to moderate adverse effects to other non-targeted wildlife species. Furthermore, Alternative C would provide more benefits to wildlife species utilizing the southern California black walnut, oak woodland, riparian, and wetland habitat, as compared to Alternative B, if invasive species can be adequately controlled through non-chemical treatment strategies (which is an area of uncertainty).

4.1.7 Special Status Species – Hopper Mountain NWR

As discussed in the CCP, there are 11 special status plant species known to occur within the refuge, including the southern California black walnut (*Juglans californica* var. *californica*), CA Rare Plant Rank 4.2; Abrams' oxytheca (*Acanthoscyphus parishii* var. *abramsii*), CA Rare Plant Rank 1B.2; club-haired mariposa lily (*Calochortus clavatus* var. *clavatus*), CA Rare Plant Rank 4.3; coast range cryptantha (*Cryptantha corollata*), Ventura County Locally Important Plants; San Bernardino larkspur (*Delphinium parryi* subsp. *Purpureum*), CA Rare Plant Rank 4.3; Leopold's rush (*Juncus acutus* subsp. *Leopoldii*), CA Rare Plant Rank 4.2; Ross' pitcher sage (*Lepechinia rossii*), CA Rare Plant Rank 1B.2, DFG S1.2 G1; coastal sage scrub oak (*Quercus dumosa*), CA Rare Plant Rank 1B.1; wire weed (*Rigiopappus leptocladus*), Ventura County Locally Important Plants; Great's aster (*Symphytotricum greatae*), CA Rare Plant Rank 1B.3; and silvery false lupine (*Thermopsis californica* var. *argentata*), CA Rare Plant Rank 4.3.

There is only 1 federally-listed wildlife special status species known to occur on the refuge, the endangered California condor. In addition, there are 4 other federally- and state-listed species and designated critical habitat that may occur in the area: the coastal California gnatcatcher (*Poliophtila californica californica*; threatened, critical habitat), Least Bell's vireo (*Vireo bellii pusillus*, endangered), southwestern willow flycatcher (*Empidonax traillii eximius*; endangered, critical habitat), and yellow-billed cuckoo (*Coccyzus americanus*; candidate). There are approximately 679 acres of coastal sage scrub on the refuge; however the threatened coastal California gnatcatcher has not been documented at the refuge. Based on their range and lack of habitat, the Least Bell's vireo, southwestern willow flycatcher, and yellow-billed cuckoo are not expected to occur on the refuge.

There are also 2 additional state-listed species, which are not federally-listed, that have been observed at the refuge: bald eagle (*Haliaeetus leucocephalus*, endangered) and Swainson's hawk (*Buteo swainsoni*, threatened). Species of special concern listed by the state of California that have been observed at the refuge that are not federally-listed include: the western burrowing owl (*Athene cunicularia*) and oak titmouse. Coastal sage scrub-associated species potentially found at Hopper Mountain NWR include coast patch-nosed snake and San Diego desert woodrat. California Partners in Flight coastal sage scrub-associated priority species potentially found at Hopper Mountain NWR include: loggerhead shrike (also a California Species of Special Concern), greater roadrunner (*Geococcyx californianus*), Costa's hummingbird (*Calypte costae*), cactus wren (*Carpnylorhynchus brunneicapillus*), wrenit (*Chamaea fasciata*), black-chinned sparrow (*Spizella atrogularis*), sage sparrow (*Amphispiza belli*), and rufous-crowned sparrow (*Aimophila ruficeps*).

4.1.7.1 Common to All Alternatives

To avoid, minimize, and/or reduce adverse impacts to special status species, several BMPs have been developed as further detailed in Appendix 1 of the EA. For example, for all alternatives, the following BMPs would be employed to protect special status species when threatened by proposed activities: 1) using an adaptive management approach, trails, roads, and/or areas would be closed to ensure that human access does not disturb special status species; and 2) prior to habitat and ground disturbing activities, potential habitat for special status species would be evaluated and, if appropriate, presence/absence surveys and additional mitigation measures taken (e.g., avoid location, change timing of action), if necessary, to ensure that planned activities do not disturb special status species. In addition, the Service would comply with all terms and conditions resulting from Section 7, Endangered Species Act consultation when specific projects are undertaken.

4.1.7.2 Alternative A – No Action

Current management would continue to have a positive effect on the California condor and other special status species under Alternative A. California condors would continue to benefit from intensive recovery efforts at Hopper Mountain, including: condor treatment and recovery efforts, fire protection measures, feeding sites, habitat management, disturbance prevention, rancher coordination, and nest protection. Visitor tours and volunteer efforts would continue to be monitored, with access limited to areas that would disturb condors. Fire protection measures and opportunistic invasive species control measures

would also continue, resulting in minor benefits to special status species that may occur in these areas. For example, fire control measures may provide long-term positive benefits to California condors by reducing the potential for more severe wildfires (e.g., stand-replacement fires) in the future. Severe stand replacement fires can reduce important habitat for ungulates that condors may feed on, as well as consume important roosting trees (Lyon et al. 2000c, Tesky 1994). More severe wildfires may also eliminate habitat that could be utilized by other special status species (e.g., coastal California gnatcatcher, least Bell's vireo, southwestern willow flycatcher, and yellow-billed cuckoo) and California Partners in Flight coastal sage scrub-associated priority species.

4.1.7.3 Alternative B – Preferred Alternative

Implementation of Alternative B would result in moderate positive impacts to the California condor relative to Alternative A. Under Alternative B, several enhanced condor management activities would be utilized to increase monitoring and survivorship, including: expanded population monitoring capabilities; mapping and protection of roost sites; upgrading support facilities and monitoring efforts (e.g., increase housing capacity to 16 residents); coordination with ranchers to allow condors to feed on natural livestock mortalities and with hunters about leaving non-lead carcasses in the field; enhanced volunteer programs and research; ungulate management; controlling microtrash through various outreach activities; and supporting research and monitoring efforts to identify and reduce the impacts to roost sites (e.g., insects, including such effects exacerbated by climate change) and foraging habitat (e.g., climate induced changes in habitat and ungulate population interactions). Such efforts would provide a long-term moderate positive effect on condors and help achieve condor recovery goals. Increases in visitor tours and volunteer programs would increase visitation to the refuge, which may increase the potential for disturbance of condors by humans. In the past, research has shown that captive bred condors may be more susceptible to human behavior causing higher potential for injury (Meretsky et al. 2000), although more recent research has shown that this effect has decreased as the wild population of condors becomes older (Cade et al. 2004). In any event, increases in guided visitor tours and volunteer outreach would be mitigated by closing areas and trails to ensure that condors are not disturbed. The condor management effort would also be enhanced through additional research, inventorying, and monitoring. Although research efforts have the potential to provide some positive benefits by improving management decisions, certain projects may have short-term, localized, minor adverse effects (e.g., human disturbance) which would be controlled and monitored as part of a SUP, with specified permit conditions and enforcement to minimize effects. Potential adverse effects to California condor from prescribed grazing will be mitigated as discussed further below. Overall, the net effect from all management activities under Alternatives B would result in moderate positive impacts to the California condor relative to Alternative A.

For other targeted special status species, additional habitat management, monitoring, and IPM strategies would be employed to benefit these species, including: 1) development and implementation of a step-down grassland HMP across 420 acres and monitoring to benefit special status species that utilize this habitat; 2) conducting presence and absence surveys for special status species in grassland and riparian/wetland habitat to determine if they are present, and if so, implementation of management measures to ensure protection of these species (e.g., California red-legged frog [*Rana draytonii*]); 3) development and implementation of a step-down HMP for southern California black walnut stands to benefit special status species (e.g., southern California black walnut and oak titmouse); 4) improving riparian habitat to benefit special status species (e.g., California red-legged frog); 5) increasing volunteer programs to support special status species projects; 6) increasing law enforcement; 7) maintaining and monitoring stands of coastal sage scrub to benefit special status species; and 8) implementing recommendations from the California Partners in Flight Bird Conservation Plans for developing coastal sage scrub habitat management measures to benefit associated California Partners in Flight focal bird species and other special status species (CalPIF 2004). Collectively, these efforts would result in long-term minor to moderate beneficial effects to targeted special status wildlife species, if successful, as well as potential for minor adverse effects, as further discussed below.

In the long term, management measures outlined above would result in long-term moderate positive benefits to special status species, if present, to the extent that these measures achieve stated objectives.

Due to a lack of site-specific research, it is uncertain to what extent these measures will generate the desired benefits to targeted special status species. Targeted special status species for this program include: western burrowing owl, Swainson's hawk, coastal California gnatcatcher, grassland California Partners in Flight focal bird species (loggerhead shrike, greater roadrunner, Costa's hummingbird, cactus wren, wrentit, black-chinned sparrow, sage sparrow, and rufous-crowned sparrow), and coastal sage scrub-associated species (e.g., coast patch-nosed snake and San Diego desert woodrat) (CalPIF 2000; CalPIF 2002a; CalPIF 2004; RHJV 2000; and Siegel and DeSante 1999). If successful, the refuge would restore and maintain a mosaic of grassland heights on up to 420 acres to benefit a range of special status species and California Partners in Flight focal bird species (Fuhlendorf et al. 2006; Shuford and Gardali 2008) as outlined in California Partners in Flight Bird Conservation Plans (CalPIF 2000; CalPIF 2002a; CalPIF 2004; RHJV 2000; Siegel and DeSante 1999). For example, taller grasses may support northern harrier (MacWhirter and Bildstein 1996), medium grass heights may support the short-eared owl (Wiggins et al. 2006), and the short grasses may support western burrowing owl (Green and Anthony 1989; Haug et al. 1993) and prairie falcon (Steenhof 1998). Maintaining grassland habitat through prescribed fire treatment has been shown to improve foraging habitat for grassland species, such as the black-chinned sparrow, Costa's hummingbird, rufous-crowned sparrow, and western burrowing owl (CalPIF 2004; Howard 1996), although opening the habitat may diminish habitat for species favoring dense scrub habitat (e.g., wrentits) (CalPIF 2004). In addition, fire may enhance California condor habitat by creating snags for future roost sites and improving foraging habitat (Lehman and Allendorf 1989). Conversely, large, severe fires may destroy roost trees (Dodd 1988). The western burrowing owl may also benefit from improved habitat and foraging conditions (Orth and Kennedy 2001; USFWS 1998); however, livestock have the potential to crush burrows (Zambrano 1998), although such effects would be infrequent given the use of enclosures and limited number of livestock in any given year (USFWS 1998). Although there may be short-term adverse and beneficial effects of vegetation control measures to targeted special status wildlife species as noted above, in the long term, improving grassland habitat quality would likely provide net benefits to those species favoring open grasslands. Such an outcome; however, is hypothesized and would need to be tested through monitoring and the adaptive management process at this refuge.

Prescribed grazing has the potential to cause both beneficial and minor adverse impacts to targeted special status species, as well as potential for minor adverse effects to 10 special status plant species. Potential adverse effects of livestock grazing on biological and natural resources that may be utilized by special status species include: proliferation of non-native and invasive species; trampling of vegetation; trench creation; wallowing during resting; habitat fragmentation; creating gaps for invasive species; overgrazing; habitat fragmentation; soil disturbance (collapsing burrows, compaction, disruption of soil crusts, and exposure to erosion); reduction in soil mycorrhizae; preferential grazing of perennials over annuals; potential adverse effects on ungulate populations; and riparian damage (as cited in Belnap et al. 2001; Belsky and Gelbard 2000; Gogan and Barrett 1987; Jones 2001; CalPIF 2000; Ellison 1960; Holland and Keil 1995; Kie et al., 1991; Krueper 1993; Lacey 1987; Loft et al. 1991; Schiffman 1997; Stewart et al. 2002; Taylor and Davilla 1986; USFWS 1998; Van Dyne and Heady 1965, Zambrano 1998). These adverse effects would be partially mitigated through implementing monitoring and adaptive management measures and mitigation measures as part of a step-down grassland HMP. Mitigation measures include: surveying for the location of special status plants that are either known to occur, or may occur, at Hopper Mountain NWR; response monitoring for both target and non-target special status wildlife species; avoidance of locations with known special status species through erecting temporary electric exclusionary fences to prevent disturbance of known locations and protection of sensitive habitat (including wetlands, riparian areas, and vernal pools); adherence to restrictions and permit conditions outlined in SUPs (e.g., livestock quarantines and location restrictions to reduce the risk of introducing invasive species from livestock and vehicles used to transport livestock [Bush 2006]); RDM and habitat monitoring to reduce the potential for overgrazing effects; and modifying permit conditions through adaptive management to ensure protection of all plant and wildlife special status species at Hopper Mountain NWR. Response of native ungulate populations to livestock grazing will be monitored and mitigated through adaptive management (to include cessation of grazing if necessary) in order to ensure that the availability of foraging opportunities (ungulate carcasses) to support California condor populations do not decline as a result of prescribed grazing activities.

The step-down grassland HMP would utilize adaptive management (considering the potential effects of climate change), research, monitoring, and grassland restoration techniques to ensure that all management regimes achieve intended goals and objectives for grassland habitat, while at the same time protecting special status plants. This effort would be enhanced through additional research, inventorying, and monitoring. For locations where special status plants or other non-targeted wildlife are present, the Service would alter management prescriptions for the unit to avoid adverse impacts to these species. As such, the Service would implement a special status species monitoring program for each special status species that may occur within a particular unit to mitigate potential adverse effects.

Given the uncertainties associated with the effectiveness of such a plan at this refuge, the Service would conduct a monitoring program of both habitat and wildlife species to evaluate the change in habitat types and the effect on wildlife for both targeted special status species and non-target special status wildlife and plants. In the event that the program is not achieving stated objectives to benefit target wildlife species, then adjustments would be made in grazing permits to improve their effectiveness to enhance habitat and wildlife objectives (to include cessation of grazing), as well as mitigate any minor adverse effects. Adjustments may involve changes in timing, stocking density, livestock type, access, maintenance, reporting, supplemental feeding methods, support equipment usage, livestock quarantine and origin restrictions (to reduce invasive species risk from livestock and vehicles used to transport livestock), and monitoring (Bush 2006, Herrick et al. 2012).

Fire protection measures, reduction in fuel loads, and planning any pile burning would be implemented to reduce risks to the California black walnut, which has also shown resiliency to low intensity, prescribed burning (Esser 1993). Protective barriers and adaptive management would also be applied during prescribed grazing to reduce the risk of overgrazing, which has been shown to adversely impact southern California black walnut stands. I&M measures and adaptive management would be employed as part of BMPs to avoid or minimize any potential short-term minor adverse effects to special status species during restoration and management projects, as outlined in Appendix 1 of the EA.

Overall, the net effect from all management activities under Alternatives B would result in minor to moderate positive impacts to targeted special status wildlife species (if present now or in the future) relative to Alternative A, with the potential for minor adverse effects to non-targeted special status species (e.g., rare plants), which would be partially mitigated through monitoring and adaptive management.

4.1.7.4 Alternative C

Implementing Alternative C would result in moderate positive impacts to the California condor, and minor to moderate positive effects to other targeted special status wildlife species (if present now or in the future), with the potential for minor adverse effects to non-targeted special status species, which would be partially mitigated through monitoring and adaptive management. Under Alternative C, similar effects to special status species previously described for Alternative B would be achieved through implementation of condor management and habitat management measures discussed previously. As part of Alternative C, expanded volunteer programs and support facilities would provide some added benefits to condor management. On the other hand, several of the management measures employed under Alternative B would not be included as part of Alternative C, such as remote monitoring capabilities, climate change and adaptation planning, and enhanced roost management. For other special status species, additional habitat management, monitoring, and fire protection measures would be implemented under Alternative C (e.g., 3.6 acres of expanded fire breaks), which would benefit the southern California black walnut and species found in riparian and wetland habitats. Overall, the net effect from all management activities under Alternatives C would result in moderate positive impacts to the California condor, and minor to moderate positive effects to other targeted special status species, with the potential for minor adverse effects to non-targeted special status species relative to Alternative A. In general, Alternative C would provide more benefits to special status species utilizing the southern California black walnut, riparian, and wetland habitat, as compared to Alternative B, while fewer benefits would be achieved for the condor under Alternative C.

Effects on the Hopper Mountain NWR Socioeconomic Environment

4.1.8 Socioeconomics – Hopper Mountain NWR

4.1.8.1 Alternative A – No Action

Alternative A would result in minor positive impacts to the local economy. Current refuge management practices would continue but would not necessarily result in changes in staff or local expenditure levels. Refuge activities (such as volunteer activities, periodic tours, refuge habitat management activities, and access to oil and gas wells) would be expected to have a very minor effect on the local area demographics and economy. Hopper Mountain NWR would remain closed to the general public, so there would be no changes in recreational activities and visitation to the refuge.

4.1.8.2 Alternative B – Preferred Alternative

Alternative B would result in a minor positive impact to the local economy. Under this alternative, Hopper Mountain NWR would experience some increased employment and spending in the local area for materials, construction, and services related to implementation of management measures outlined for Alternative B. Using the Economic Impact Forecast System (EIFS) model, developed by the U.S. Army Corps of Engineers, the increase in employment (estimated to be 5 direct and induced jobs total) and expenditures would have a very minor positive impact on demographics and the economy of the local area (EIFS 2011). The increase in total direct and induced sales volume related to the implementation Alternative B totaled approximately \$1,150,000 per year (reasonable upper-bound expenditures in any given year during the next 15 years), with a net increase in direct and induced income of \$222,000 per year. Both of these metrics represent less than a 0.005% change in historical economic activity in Ventura County, which is well within the norms of historic variation in economic activity for this region. These figures, however, do not include economic activity generated by the general public engaging in non-consumptive recreational activity during limited tours and volunteer efforts at the refuge (e.g., lodging, refreshments, restaurants, fuel, and supplies). Under Alternative B, additional outreach events, interpretive walks, and enhanced volunteer activities would increase non-consumptive recreation activities on the refuge, but such actions would have a negligible effect on the economy given that the refuge would remain closed to the general public.

Under this alternative, prescribed grazing is being considered for the grassland, southern California black walnut, and oak woodland areas. To estimate the economic value of allowing prescribed grazing, the animal unit month (AUM) to acreage ratio used by the Refuge Complex when grazing was permitted in the past (prior to 2005) was assumed for estimating a reasonable upper-bound grazing intensity for the refuge of approximately 50 AUM over a 7-month period (November to May). Collectively, ranchers would save approximately \$5,250 per year if grazing was permitted at this level on the refuge, as compared to grazing on privately held lands.¹ The \$5,250 annual savings would be meaningful to individual ranchers who hold grazing agreements, thereby decreasing operating costs and making their products more competitive relative to ranchers using private grazing lands. However, this cost benefit would be negligible considering the size of the regional economy and the availability of other grazing lands.

4.1.8.3 Alternative C

Alternative C would result in a minor positive impact to the local economy. This alternative would be more beneficial than Alternative A, but less so than Alternative B. Under this alternative, Hopper Mountain NWR would experience some increased employment and spending in the local area for materials, construction, and services. Using the EIFS model, the expected sales volume and income would be slightly less than expected under Alternative B and would represent a less than 0.005% increase in historical economic activity for Ventura County, which is well within the norms of historic variation in

¹This estimated amount is determined assuming that the average California rate for grazing is \$16.40 per AUM (USDA 2011) and the federal grazing fee is \$1.35 per AUM (DOI 2011).

economic activity for this region (EIFS 2011). These figures, however, do not include economic activity generated by the general public engaging in non-consumptive recreational activity during limited tours and volunteer efforts at the refuge (e.g., lodging, refreshments, restaurants, fuel, and supplies). Under Alternative C, additional outreach events, interpretive walks, and enhanced volunteer activities would increase non-consumptive recreation activities on the refuge, but such actions would have a negligible effect on the economy given that the refuge would remain closed to the general public. Grazing effects would be the same as those estimated for Alternative B.

4.1.9 Public Use – Hopper Mountain NWR

4.1.9.1 Common to All Alternatives

Under all alternatives, Hopper Mountain NWR would remain remote, relatively inaccessible, closed to the general public, and visited only during scheduled tours and volunteer events by members of the general public. For all alternatives, the refuge would continue to support feasible wildlife-dependent public uses (i.e., observation and photography, and environmental education and interpretation) to some extent, in consideration of condor management goals. No public roads would be constructed that provide access to the refuge, where unsupervised interaction would conflict with Recovery Program activities. Educational presentations on the condor and the Recovery Program would continue to be offered to community groups, schools, etc., and interpretative tours would continue to be provided through the Service.

4.1.9.2 Alternative A – No Action

Alternative A would result in no change to public use and visitation. Hopper Mountain NWR would remain closed with periodic patrols and tours, and public outreach and education would continue to be conducted largely offsite. Outreach and public education activities include partnering with agencies and public groups, and website updates. Guided tours would be conducted periodically, providing limited access to the refuge. Approximately 3-4 guided tours per year occurred in the past with about 100 visitors per year, thereby providing some minor beneficial recreational use of the refuge.

4.1.9.3 Alternative B – Preferred Alternative

Alternative B would result in minor positive benefits to residents through increased recreational opportunities and access. The Service would develop a Visitor Services Plan for Hopper Mountain NWR to increase public awareness and volunteer programs. Controlled visitation at the refuge would increase to include at least 4 refuge tours per year for wildlife observation and photography. In addition, approximately 2 volunteer projects per year would be conducted at the refuge to include selective planting of species compatible with the refuge's long-term goals, removal of invasive plants, and surveying of plants and wildlife. Outreach materials would be updated and off-site public involvement events would be expanded (goal of educating 500 residents in 5 years about the refuge and condor effects from lead and microtrash). In addition, educational outreach activities would be targeted to oil and gas operators about the effects of microtrash on condors, installing landing deterrents on rigs, and discouraging site access during condor fledgling periods. Enhanced habitat and wildlife management efforts implemented as part of Alternative B may also increase the wildlife-dependent recreational experience of visitors and volunteers engaged in photography or observation. Overall, there would be minor positive benefits to residents through increased recreational opportunities and access from implementing Alternative B relative to Alternative A.

4.1.9.4 Alternative C

Alternative C would result in minor positive benefits to residents through increased recreational opportunities and access. Under Alternative C, additional outreach events, interpretive walks, and enhanced volunteer activities would increase non-consumptive recreation activities on Hopper Mountain NWR, resulting in positive impacts to public use. There would be expanded volunteer projects on and off the refuge. Partnerships would be established with the local government and with the schools. This alternative also includes exploring future options for additional wildlife-dependent recreation. Public access would be carefully monitored to ensure there is no disturbance of condor nesting areas and habitat, in accordance with BMPs presented in Appendix 1 of the EA. In addition, prescribed grazing would be

permitted on the refuge, which would provide additional cost effective opportunities for ranchers in the area to graze livestock. In general, Alternative C would provide more benefits to residents through increased recreational opportunities and access, as compared to Alternatives A and B.

4.1.10 Cultural Resources – Hopper Mountain NWR

4.1.10.1 Alternative A – No Action

Minor adverse impacts would occur to cultural resources under Alternative A from potential disturbance of yet unidentified cultural resource sites. Actions that physically disturb a site, alter its setting, or introduce elements out of character with the site may constitute an adverse effect. The Service would continue to manage and conserve cultural resources at Hopper Mountain NWR and comply with section 106 of the National Historic Preservation Act of 1966 (NHPA), as amended, including consultation with the State Historic Preservation Officer (SHPO) and pertinent tribes, in order to avoid, eliminate, or minimize adverse effects. Prior to ground disturbing activities, surveys would be conducted and other requirements would be followed to minimize the potential for adverse effects to cultural resource sites that have yet to be discovered in accordance with applicable regulations and guidance. Under Alternative A, Hopper Mountain NWR would remain closed to public use, which would further reduce potential for adverse effects.

Cultural resources investigations performed on Hopper Mountain NWR were done while the land was still under U.S. Forest Service ownership or in response to wildfires. The total acreage surveyed as a result of these efforts is less than 1% (approximately 20 acres). One prehistoric-historic era multi-component site is recorded within the refuge boundaries in a rock formation. Other sites or features are known to exist but have not been recorded. Fieldwork on the refuge has fallen into 3 categories: 1) third parties fulfilling requirements to obtain conditional use permits for oil exploration; 2) compliance with section 106 of the NHPA; and 3) post-wildfire damage assessment. It is reasonable to assume that additional archaeological sites would be exposed by human actions or natural causes in the future.

Minor impacts to cultural resources from actions proposed by the Service would be minimized through cultural resource reviews, surveys, and compliance with section 106 of the NHPA when a site-specific action is undertaken. All sites discovered in the future would be treated as eligible for listing on the National Register of Historic Places (NRHP) until listed or formally evaluated as ineligible in consultation with the SHPO. Under federal ownership, archaeological and historical resources within a refuge receive protection under federal laws mandating the management of cultural resources, including but not limited to the Archaeological Resources Protection Act (ARPA), Archaeological and Historical Preservation Act (AHPA), Native American Graves Protection and Repatriation Act (NAGPRA), and NHPA. If any cultural resources are discovered on the refuge, the Service would take all necessary steps to comply with section 106 of the NHPA, to include consultation with the SHPO and pertinent tribes. None of the archaeological sites on Hopper Mountain NWR are documented as containing human remains. However, sites identified in the future could be found to contain human remains, funerary items, sacred objects, or items of cultural patrimony and may therefore require consideration under the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA). The Service will comply with the NAGPRA consultation process and other applicable laws and guidance required for consideration of human remains.

4.1.10.2 Alternative B

Alternative B may increase adverse effects to cultural resources because of the expanded visitor tours and volunteer efforts, habitat management, construction, and other activities that would increase human activity and potentially disturb and expose soils. Actions that physically disturb a site, alter its setting, or introduce elements out of character with the site may constitute an adverse effect. Since only limited cultural resource surveys have been conducted at the Hopper Mountain NWR, it is reasonable to assume that additional archaeological sites would be exposed by human actions or natural causes in the future. Potential adverse effects to cultural resources would be fully determined when specific and detailed project plans are available. As with Alternative A, when sufficient details about proposed ground

disturbing activities are available, the Service would follow the same process to comply with section 106 of the NHPA and NAGPRA, and other applicable laws, as described in section 4.1.10.1.

4.1.10.3 Alternative C

Under Alternative C, similar minor adverse effects to cultural resources previously described for Alternative B would occur from implementing Alternative C. Alternative C may increase adverse effects to cultural resources because of the expanded visitor tours and volunteer efforts, habitat management, construction, and other activities that would increase human activity and potentially disturb and expose soils. The adverse effects would be slightly higher for Alternative C, relative to Alternative B, due to the additional ground disturbing activities being proposed (an additional 3.6 acres of vegetation clearing for fire breaks). Actions that physically disturb a site, alter its setting, or introduce elements out of character with the site may constitute an adverse effect. Since only limited cultural resource surveys have been conducted at the Hopper Mountain NWR, it is reasonable to assume that additional archaeological sites would be exposed by human actions or natural causes in the future. Potential adverse effects to cultural resources would be fully determined when specific and detailed project plans are available. As with Alternative A, when sufficient details about proposed ground disturbing activities are available, the Service would follow the same process to comply with section 106 of the NHPA, NAGPRA, and other applicable laws, as described in section 4.1.10.1 when ground disturbing activities are proposed.

4.1.11 Environmental Justice (Common to all Alternatives) – Hopper Mountain NWR

On February 11, 1994, the President issued Executive Order 12898 *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, requiring that all federal agencies achieve environmental justice by “identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority population and low-income population.” Environmental justice is defined as the “fair treatment for peoples of all races, cultures, and incomes, regarding the development of environmental laws, regulations, and policies.”

The mission of the Service is working with others to conserve, protect, and enhance fish and wildlife and their habitats for the continuing benefit of the American people. The developing environmental justice strategy of the Service extends this mission by seeking to ensure that all segments of the human population have equal access to America’s fish and wildlife resources, as well as equal access to information that would enable them to participate meaningfully in activities and policy shaping.

Hopper Mountain NWR is located in a remote area with low population density. With respect to poverty levels, the areas around the refuge have poverty levels that are below the state average (13.2% in Fillmore, California, versus 14.2% for the state). However, there are much higher percentages of Hispanic or Latino populations (75%) near Hopper Mountain NWR than what is found at the state level (48%) (U.S. Census Bureau 2011). In any event, due to the nature of the action and the analysis previously discussed, the Service has concluded that the proposed action does not result in disproportionately high and adverse human health or environmental effects to any of the communities around the refuge. Furthermore the Service has concluded that no minority and low-income populations or communities would be disproportionately affected by any of the alternatives. Therefore, there are no environmental justice concerns associated with implementing any of the alternatives.

4.1.12 Cumulative Effects – Hopper Mountain NWR

In this section, the cumulative effects of the proposed alternatives are analyzed. Cumulative impacts are considered to be those that result from the incremental effects of the Service’s proposed action when added to past, present, and reasonably foreseeable future actions, regardless of the agencies or parties involved. Cumulative impacts can result from individually minor, but collectively significant, actions occurring over time. For an EA, the cumulative impact analysis is done only to a sufficient level to allow the decision maker to make a determination of significance for the proposed action, as stated in the Service Manual (550 FW 1). Thus, this analysis focuses on whether implementation of the CCP’s preferred alternative (Alternative B), or combinations of management measures being considered for

other alternatives (i.e., Alternatives A or C), would result in a significant cumulative adverse impact. A summary of these findings is provided here for each aspect of the environment, including the physical, biological, and social environment, as appropriate. Cumulative impacts are considered for a 15-year period for the refuge and surrounding areas, which is the projected time frame for implementing the CCP.

An important component of this analysis is evaluating other past, present, and reasonably foreseeable actions occurring within the study area (i.e., the refuge and surrounding areas in Ventura County) that may contribute to cumulative effects, as outlined here.

- Regional growth and development over past decades has increased, and this trend is projected to continue into the future. This growth has resulted in reduced and fragmented habitat throughout the region beyond the boundaries of the refuge, increasing traffic generation, soil disturbance, and air emissions in the region (e.g., population growth in Ventura County has risen by 9.3% from 2000 to 2010 and is projected to increase [U.S. Census Bureau 2011], which has resulted in additional residential development in nearby Fillmore [Ventura County 2012]);
- Energy projects and other infrastructure projects in the region have increased in past decades (in the past oil and gas exploration, and more recently renewable energy projects) and additional projects may occur, resulting in reduced and fragmented habitat beyond the boundaries of the refuge, along with increased physical obstructions for birds (e.g., transmission lines maintained by Southern California Edison [CEC 2011]; oil and gas exploration; roads; and telecommunication towers);
- Changes in agricultural practices and reduced grazing opportunities may have reduced potential forage for California condors and reduced grazing opportunities for ranchers due in part to the creation of the refuge and continued growth in development throughout the region;
- Wildfire risks and intensity have the potential to increase in the coming decades due to climate change and expanded development; and
- Hydrology has been adversely impacted by past grazing and water control measures and may be adversely impacted in coming decades by global and regional climatic events (e.g., increased frequency in extreme weather events [storm events causing increased erosion and increased incidence and severity of droughts]).

Physical Environment. Additional minor cumulative adverse impacts on air quality and noise would occur from implementing the proposed action, when added to air and noise impacts associated with increased development in the region, fugitive ROG emissions from oil and gas operations, population growth, and expansion of energy and transportation infrastructure. Increases in fuel efficiency, energy conservation, and renewable energy usage in the region may partially mitigate for cumulative air quality effects. No additional cumulative effects are expected to geologic resources, soils, or water quality to the regional study area from implementing the proposed action given the size of the refuge and the limited activities that occur within the refuge. Localized positive benefits to hydrology from implementing the proposed action would not likely offset cumulative adverse effects at the regional scale associated with development, expansion of infrastructure, and climatic events.

Biological Environment. Although implementing Alternatives A, B, or C would provide positive benefits to vegetation, wildlife, and special status species, it is unlikely that such actions would offset adverse cumulative effects occurring from other stressors at a regional scale, with the possible exception of the California condor. Expansion of energy and telecommunication infrastructure (e.g., oil and gas development, transmission lines, and communication towers), urban expansion, grazing, [arguably] increasing fire frequency, and expansion of transportation infrastructure in the region have resulted in cumulative adverse effects to vegetation (e.g., 90% loss of riparian forest communities, loss of southern California black walnut stands, loss of oak woodland habitat, and loss of native grasslands), wildlife, and

special status species outlined previously (CalPIF 2000; CNPS 2010; Davis et al. 1995; Germano et al. 2001; Katibah 1984; Knopf et al. 1988; USFWS 2010). With respect to condor population growth and survivorship, regional loss of cattle ranches due to continued development may continue to reduce forage opportunities for condors. Ingestion of lead pellets in forage and microtrash has also resulted in condor mortalities, but monitoring and treatment efforts, public outreach, and restrictions on use of lead would reduce effects to condors in the future. Given the intensity of active management for the condor by the Service and others, it is likely that implementing Alternatives B or C may result in net beneficial cumulative effects for the condor, with population levels and survivorship increasing during the next 15 years.

Socioeconomic Environment. Cumulative minor beneficial effects may occur to socioeconomics, as development growth, combined with increases in refuge expenditures and activities as proposed in the CCP, would induce additional economics growth for the region (approximately \$1.2 M per year in increased employment and spending from direct and induced economic activity). Furthermore, re-establishing limited grazing activity would also provide some economic benefits to individual ranchers (as detailed in section 4.1.8), although such effects would be negligible for the overall regional economy. No cumulative effects are expected for cultural resources, public use, or environmental justice concerns.

4.2 Bitter Creek National Wildlife Refuge

Table 4-2 presents a summary of the effects to resources at Bitter Creek NWR from implementing the 3 alternatives. Resource specific effects are described in sections 4.2.1 through 4.2.14.

Table 4-2. Summary of Environmental Effects for each Alternative: Bitter Creek NWR

Resource	Alternative A: No Action Alternative (Maintain Current Management)	Alternative B: Preferred (Relative to Alternative A: No Action)	Alternative C (Relative to Alternative A: No Action)
Physical Environment –Bitter Creek NWR			
Geology and Soils	Minor short-term negative impact, fire management practices would temporarily expose soils to erosion.	Minor short-term negative impact from minor vegetation clearing for habitat management, prescribed grazing, maintaining hiking trails/roads, and minor construction/restoration projects, which would expose soils to erosion.	Similar to Alternative B. Overall, impacts would be slightly more negative than Alternative B due to more intensive habitat restoration and additional construction projects, which would expose soils to erosion.
Air Quality	Minor negative impact due to particulate emissions from pile burning used to reduce wildfire risk and maintain roads and fire breaks. Vehicle emissions would continue from management efforts, volunteer activity, and limited guided tours.	Minor negative impact from increased particulate emissions from pile burning for vegetation management and additional vehicle emissions from increased visitation, while minor positive impacts would occur from reducing carbon footprint.	Minor negative impact from increased particulate emissions from pile burning for vegetation clearing and additional vehicle emissions from increased volunteer activities and additional visitors. Overall, impacts would be more negative than Alternative B due to additional pile burning and additional vehicle emissions from more visitors/volunteers and no reduction in the carbon footprint.
Noise	Minor negative impact from vehicle and equipment access through local areas.	Minor negative impact from increased vehicle traffic and equipment access through local areas.	Minor negative impact from increased vehicle traffic and equipment access through local areas.

Resource	Alternative A: No Action Alternative (Maintain Current Management)	Alternative B: Preferred (Relative to Alternative A: No Action)	Alternative C (Relative to Alternative A: No Action)
Water	Minor short-term negative impact to water quality from increased erosion, while no effect on hydrology.	Minor short-term negative effect on water quality from increased erosion (e.g., from prescribed grazing and construction projects), while positive effect on hydrology and water quality from restoring natural hydrology and habitat restoration efforts.	Similar to Alternative B. Overall, impacts would be slightly more intense than Alternative B due to more intensive habitat restoration and enhanced riparian hydrology restoration.
Biological Environment –Bitter Creek NWR			
Vegetation	No short-term impact, as vegetation cover and communities would be maintained. Long-term minor positive to no impact from thinning, and vegetation clearing to reduce the risk of more severe fires in the long term.	Minor positive and negative effects on native plant species and communities, with the potential for localized moderate positive and negative effects from implementing the grassland Habitat Management Plan, enhanced IPM, riparian habitat protection, partial closure of water control system restoring hydrology, road closures, restoration of riparian hydrology, woodland habitat management measures, climate change adaptation, and enhanced volunteer programs (assisting with invasive species removal, restoration, and monitoring). Some species and areas may experience minor to moderate negative impacts from habitat manipulation (e.g., prescribed grazing using adaptive management), limited clearing, herbicide application, and trampling from increased human activity.	Minor positive and negative effects on native plant species and communities, with the potential for localized moderate positive and negative effects from implementing the grassland Habitat Management Plan, enhanced habitat restoration, enhanced IPM (without chemicals), riparian habitat protection, reduction in water diversions, partial restoration of riparian hydrology, woodland habitat management, climate change adaptation, and enhanced volunteer programs (assisting with invasive species removal, restoration, and monitoring). Some species and areas may experience minor to moderate negative impacts from enhanced habitat manipulation (e.g., prescribed grazing using adaptive management) and trampling from increased human activity. Overall, positive impacts are similar to Alternative B, with more positive effects on grasslands and riparian areas.
Wildlife Resources	Minor positive impact to wildlife species would continue from habitat management, opportunistic fence replacement, invasive species control, and additional monitoring.	Minor to moderate positive impact to targeted wildlife species from enhanced habitat adaptive management, installing wildlife-friendly fencing, restoring hydrology in riparian areas, invasive species control, monitoring, research, and expanded volunteer programs benefiting wildlife (habitat restoration and monitoring), while some non-targeted species have the potential to experience local, minor to moderate negative impacts from habitat changes (e.g., prescribed grazing using adaptive management), construction projects, herbicide usage, increases in visitors and volunteer disturbance and trampling of habitat, and condor management.	Minor to moderate positive impact to targeted wildlife species from enhanced habitat adaptive management, installing wildlife-friendly fencing, restoring water hydrology, invasive species management, and expanded volunteer programs benefiting wildlife (habitat restoration and monitoring), while some non-targeted species have the potential to experience local, minor to moderate negative impacts from habitat changes (e.g., prescribed grazing using adaptive management), construction projects, increases in visitors and volunteer disturbance and trampling of habitat, and condor management. Overall, Alternative C would generate slightly more positive impacts to wildlife in grassland and riparian habitat, as compared to Alternative B.

Resource	Alternative A: No Action Alternative (Maintain Current Management)	Alternative B: Preferred (Relative to Alternative A: No Action)	Alternative C (Relative to Alternative A: No Action)
Special Status Species	Moderate positive impacts to condor survivorship, foraging opportunities, and habitat would continue from condor management activities at the refuge. Fire protection and invasive species control measures would continue to provide minor benefits to other special status species, survivorship, and habitat quality where they occur.	Moderate positive impact from management measures to increase monitoring and survivorship, foraging opportunities, and habitat for condors. Minor to moderate positive and minor negative impacts would occur to other special status species from enhanced habitat adaptive management (e.g., prescribed grazing), monitoring, fencing, research, staffing, and enhanced volunteer efforts relative to benefitting special status species, survivorship, and habitat quality. Effects to Kern mallow, such as trampling during prescribed grazing, will be mitigated by thorough inventorying of species, installing exclusion fencing as needed, and avoidance.	Moderate positive impact from management measures to increase monitoring, survivorship, foraging opportunities, and habitat for condors. Minor to moderate positive and minor negative impacts would occur to other special status species from enhanced habitat adaptive management (e.g., prescribed grazing), monitoring, research, staffing, and enhanced volunteer efforts relative to benefitting special status species, survivorship, and habitat quality. Effects to Kern mallow, such as trampling during prescribed grazing, will be mitigated by thorough inventorying of species, installing exclusion fencing as needed, and avoidance. Alternative C would provide more benefits to special status species, survivorship, and habitat quality in grassland, riparian, and wetland habitat as compared to Alternative B, while the effects to condors would be similar.
Socioeconomic Environment –Bitter Creek NWR			
Socioeconomics	Minor positive impact to the local economy. Staff and expenditure levels would remain the same.	Minor positive impact to the local economy from increased non-consumptive recreational use of the refuge and visitors, increased expenditures, and staffing changes. Prescribed grazing would also create economic opportunities for grazing agreement holders.	Minor positive impact from increased guided tours and volunteer participation, staffing, and expenditures. Prescribed grazing would also create economic opportunities for grazing agreement holders. Overall, impacts are slightly more positive than Alternative B.
Public Use	No change in public access, as the refuge would remain closed to public use with periodic patrols and limited guided tours providing minor benefits.	Moderate positive impact from increased non-consumptive recreational use of the refuge, opening a single public trail, enhanced facilities, enhanced outreach, and expanded volunteers.	Moderate positive impact from increased non-consumptive recreational use, opening public trails, enhanced facilities, expanded volunteer opportunities, and additional guided trips. Overall, impacts are more positive than Alternative B.
Cultural Resources	Minor negative impact to yet unidentified sites due to human activity and management resulting in potential for disturbance of unknown cultural resources. Any future impacts minimized through cultural resources reviews and surveys, as required.	Minor negative impact from soil disturbance, increased public access, construction, and demolition resulting in potential for disturbance of unknown cultural resources. Impacts minimized through cultural resources reviews and surveys, as required. Some positive effects of implementing expanded cultural resources program and proactive surveys.	Same as Alternative B, but with additional positive effects from implementing proactive cultural resources protection measures.

Resource	Alternative A: No Action Alternative (Maintain Current Management)	Alternative B: Preferred (Relative to Alternative A: No Action)	Alternative C (Relative to Alternative A: No Action)
Environmental Justice	No impact.	Same as Alternative A, no impact.	Same as Alternative A, no impact.

Effects on the Bitter Creek NWR Physical Environment

4.2.1 Geology and Soils – Bitter Creek NWR

4.2.1.1 Alternative A – No Action

Continuation of current refuge management practices would have a minor adverse effect on soils and no adverse effects on geologic resources. There would be no change in impact from continuation of current measures. Maintenance activities involving limited vegetation clearing, mowing, and disking would continue across approximately 85 acres of the refuge (0.6% of the refuge) for reducing fuel loads, maintaining fire breaks, invasive species removal, and road/trail maintenance. Although the majority of this maintenance activities would not disturb soils (e.g., mowing activities), limited disking and vegetation clearing activities can temporarily expose soils, resulting in an increase in water and wind erosion. In addition, limited human access, vehicle access, and equipment usage may result in localized compaction of soils. Vehicle access and heavy equipment usage may also increase the potential for small releases of oils, grease, and other petroleum products to soils. Soil erosion control measures, avoidance of riparian and wetland habitat, adherence to Service regulations and policy, and BMPs discussed in Appendix 1 of the EA would reduce potential adverse effects to soils. Given the localized and/or temporary nature of these effects and BMPs specified in Appendix 1 of the EA, minor adverse effects would occur to soil resources.

Service-approved herbicides/pesticides would be used as part of an IPM plan for controlling pests. Pesticides used at Bitter Creek NWR include: Transline application on approximately 25 acres and Pathfinder II application on approximately 35 acres. In accordance with BMPs (see Appendix 1 of the EA), the Service would maintain unsprayed buffer areas near aquatic habitats and other sensitive areas. The active ingredient in Transline, clopyralid, has limited mobility in soils where studies have shown that the average movement of the herbicide was 11 inches in the soil column, with no detectable residue in leachate (Cornell University 2012). Furthermore, the average half-life of clopyralid is 25 days, based on 20 field studies, with degradation driven by soil microbial processes. Clopyralid is considered relatively non-toxic to invertebrates (earthworm LC50 > 1,000 mg/kg dry soil) and is broken down naturally by microorganisms (USFS 2004). Thus, application of Transline is considered to have only a minor adverse effect on soils. The active ingredient in Pathfinder II, triclopyr butoxyethyl ester (triclopyr BEE), hydrolyzes rapidly in soils (0.2 days) and also undergoes photolysis and microbial metabolism. Metabolites are further degraded with half-lives of 10 to 100 days depending on soil conditions (USFS 2011b). Risk assessment studies of triclopyr when used in accordance with the label indicate that soil invertebrates are not adversely affected (USFS 2011b). The Service would also avoid application of pesticides where seasonal precipitation or excess irrigation water is likely to wash residual toxic substances into waterways. Furthermore, herbicide/pesticide treatments for the control or removal of invasive plants in riparian/wetland areas must be limited to hand or wick applications by qualified personnel. Through the IPM process, chemical means for controlling pests are minimized in favor of other non-chemical strategies. When chemicals are used, the Service would follow standard BMPs including adherence to all EPA and California EPA warning labels and application requirements, as well as the Service's PUP process regulations. This highly regulated and integrated process carefully considers the environmental hazards, efficacy, costs, and vulnerability of the pesticide being used. Given this process and their limited use, the Service concludes that their use would have a minor adverse effect on soils, while providing a net beneficial effect to biological resources as noted in the sections to follow.

Additionally, potential effects to the biological and physical environment associated with the proposed site-, time-, and target-specific use of pesticides PUPs on the refuge would be evaluated using scientific information and analyses in this chapter. PUPs (including appropriate BMPs) would be approved where scientific evidence indicates that effects to refuge biological resources and its physical environment are likely to be minor, temporary, or localized in nature. Along with the selective use of pesticides, PUPs would also describe other appropriate IPM strategies (biological, physical, mechanical, and cultural methods) to eradicate, control, or contain pest species to achieve resource management objectives.

The effects of non-pesticide IPM strategies to address pest species on the refuge would be similar to those effects described elsewhere within this chapter, where they are discussed specifically as habitat management techniques to achieve resource management objectives on the refuge. For example, the effects of mowing to control invasive plants in an improved pasture would be similar to those effects summarized for mowing, where it would be specifically used to provide short grass foraging habitat for wildlife.

Based on scientific information and analyses in this chapter, pesticides allowed for use on the refuge would be of relatively low risk to non-target organisms as a result of low toxicity or short persistence in the environment. Thus, potential impacts to refuge resources and neighboring natural resources from pesticide applications would be expected to be minor, temporary, or localized in nature.

4.2.1.2 Alternative B – Preferred Alternative

Implementing Alternative B would have a minor adverse effect on soils and no adverse effects on geologic resources. Under Alternative B, more intensive habitat management (e.g., prescribed grazing) and invasive species control measures would be implemented (as further discussed in section 4.2.5), along with small scale construction and restoration projects to support condor management (about 0.25 acres in size collectively for all construction projects), visitor services (e.g., refuge offices, visitor contact station, kiosk, and parking), trail establishment and maintenance (e.g., 1-mile loop trail off Klipstein Canyon, disturbing 0.5 acres), habitat restoration (e.g., prescribed grazing), and road maintenance (e.g., removing and redesigning runoff control measures). All construction activities, including the trail establishment, would expose less than an acre of soils collectively, while the additional tamarisk removal would temporarily disturb up to an additional 35 acres of soils due to digging and physical removal of plant roots. Construction and vegetation removal activities would also involve the use of heavy equipment, which can compact soils and increase surface water runoff and erosion. Prescribed grazing can result in compaction of soils and formation of terracette (micro-formation of step like structures prone to erosion) resulting in increased surface water runoff and erosion, as well as exposing soils from trampling and vegetation removal (Butler 1995, Blackburn 1975, Gifford and Hawkins 1978, Higgins 1982, Roberson 1996, and Trimble and Mendel 1995). Collectively, these management activities would increase the potential for short-term, localized exposure of bare soils resulting in increased water and wind erosion. Implementation of BMPs (see Appendix 1 of the EA) would minimize loss of soils during soil disturbing activities of clearing and grading needed for construction. In the long term, road maintenance activities and closing certain road networks that are used to service the water control system would provide positive benefits by restoring vegetation habitat and reducing soil erosion in these areas. Closing road networks would not contribute to soil erosion because refuge staff would simply stop using the roads and, over time, these areas would be re-vegetated by grasses and other native vegetation. Overall, the net effect from all management activities under Alternatives B would result in minor, short-term, localized adverse impacts to soils and no adverse effects on geologic resources relative to Alternative A.

4.2.1.3 Alternative C

Under Alternative C, similar minor adverse effects to soils previously described for Alternative B would occur from implementing this alternative. Alternative C would include additional short-term soil disturbing activities associated with more intensive grassland habitat restoration measures (e.g., prescribed grazing can temporarily expose and disturb soils and increase erosion [Gifford and Hawkins 1978; Roberson 1996], and physical disturbance from equipment used for mowing, tilling, and plantings can disturb soils), tamarisk removal (an additional 5 acres of digging and removing tamarisk, which

would temporarily expose soils and increase erosion), establishing fire breaks around condor roosts, and additional small scale construction and trail establishment (e.g., road improvements, small facility projects, parking area and trail off Cerro Noroeste Road). This activity would result in short-term, minor adverse effects to soils in the project area due to exposing soils to erosion (wind and water), which would be minimized by implementing BMPs outlined in Appendix 1 of the EA. On the other hand, grassland habitat restoration measures in the long term may increase the extent of vegetation cover, thereby reducing exposure of bare soils and erosion potential in degraded habitat. Under this alternative, the IPM would not include the use of chemical methods for controlling non-native species, invasive species, and noxious weeds, which would reduce some of the minor adverse effects to soils. Overall, the net effect from all management activities under Alternatives C would result in short-term, localized, minor adverse impacts to soils and no adverse impacts on geologic resources relative to Alternative A. In general, Alternative C would result in slightly more adverse effects to soils as compared to Alternative B due to the additional ground disturbing activity from more intensive habitat restoration efforts, digging out clumps of tamarisk, fire breaks, and additional small-scale construction projects discussed previously.

4.2.2 Air Quality – Bitter Creek NWR

Bitter Creek NWR is located in the San Joaquin Valley Air Basin and is regulated by the San Joaquin Valley Unified Air Pollution Control District. This basin is classified as being in severe nonattainment status for ground-level ozone and nonattainment for PM₁₀.

4.2.2.1 Alternative A – No Action

Minor adverse impacts to air quality would remain the same under Alternative A. Limited pile burning would continue to reduce fuel loads and burn vegetation cleared for fire break and trail maintenance, opportunistic removal and disposal of dilapidated fencing (wooden posts), and to protect facilities from wildfires. Pile burning is used primarily in winter, when air quality is less likely to be adversely affected. The approved update to the Fire Management Plan for Bitter Creek NWR allows pile burning of vegetation (USFWS 2009). The Service would continue to suppress all wildfire and implement fire prevention measures (such as fuel breaks) at the wildland urban interface (WUI) and roads. As the area is fire prone, fuels would be reduced through mowing, disking, and targeted vegetation removal for clearing fire breaks, roads, and trails, and near facilities for all alternatives. In addition, several condor and habitat management measures would require vegetation removal. Such actions would generate brush piles that would be periodically burned in coordination with the San Joaquin Valley Unified Air Pollution Control District and in accordance with permit requirements. Such activities can generate fine particulates and contribute to regional emissions of PM₁₀. Other refuge activities that generate PM₁₀, ozone precursors (ROG and NO_x), and carbon include vehicle use associated with limited visitor trips, volunteer efforts, and heavy equipment use (e.g., tractor emissions, on-road cars and trucks, and off-road ATVs) from the combustion of fossil fuels. Activities that disturb and expose the soil, such as mowing, disking, grading (road maintenance of 26 miles of roads), vegetation clearing, and other activities, can also generate increased particulate emissions, particularly during windy conditions. Emissions associated with these activities would generate minor, localized adverse impacts to air quality. However, such emissions would be temporary and would cause only minor adverse impacts to regional air quality, as pile burning activities would be conducted in accordance with San Joaquin Valley Unified Air Pollution Control District burn permits, with predetermined prescription levels, and in close coordination with this agency to minimize effects in consideration of timing, prescription levels, wind direction, and distance from receptors. Dust control measures would also be implemented to minimize emissions associated with fuel loads reduction and mowing. Emissions associated with vehicle trips and equipment usage would be minor given the level of activity at the refuge relative to current emissions within the San Joaquin Valley Air Basin associated with regional traffic and equipment usage. Thus, air emissions for activities under Alternative A are considered minor.

4.2.2.2 Alternative B

Implementing Alternative B would result in minor adverse effects to air quality. Management activities under Alternative B that would generate additional air emissions, include: 1) construction (condor flight pen, 1,000-square-foot condor treatment facility, RV hook-ups, pull-out condor observation point,

renovation at Cliff Hudson house site, refuge offices, visitor contact station and parking, and construction of a wind/rain gauge weather station); 2) maintenance of condor roosting sites; 3) implementation of a grassland HMP and expanded grassland management (e.g., managing up to 9,000 acres of grasslands, including increased mowing, vegetation clearing, prescribed grazing, and herbicides); 4) enhanced visitation from partially opening Bitter Creek NWR to public use, including establishing a 1-mile loop trail off Klipstein Canyon; and 5) additional volunteer activities. Site specific vegetation clearing activities (i.e., for construction, condor roost management) would generate additional pile burning activities relative to Alternative A. Over the next 15 years, up to approximately 250 additional piles (each pile is estimated to be 2 to 3 feet high and about 16 square feet at the base) of trimmings would be burned on the refuge for fuels reduction and to clear roads. In some cases, grazing prescriptions may provide unspecified measures of wildfire fuels reduction. In addition, clearing, construction, and prescribed grazing activities would result in temporary increases in exposed soil, which would increase fugitive dust emissions, particularly during strong winds. Also, increased habitat management (clearing, disking, mowing), construction, and visitor and volunteer activities under Alternative B would result in increased use of vehicles (e.g., on-road cars and trucks, and off-road ATVs) and heavy equipment (e.g., tractors), and would make soils vulnerable to erosion from clearing, mowing, disking, and grading during construction. These activities would result in very minor and temporary increases in PM₁₀, ROG, NO_x, and carbon emissions relative to Alternative A. Closure of many roads as part of water management initiatives would reduce these effects by minimizing the amount of grading, mowing, and pile burning that would have been required to maintain these roads under Alternative A. Road closure would consist of simply barricading the road, and eventually grasses will colonize the area. Furthermore, limited grazing may increase soil disturbances and fugitive dust emissions. On the other hand, additional carbon emission reduction measures and other “green” activities would be implemented to reduce the carbon footprint emissions of refuge activities, as well as ROG and NO_x emissions from reduced vehicle trips. Overall, the Service plans to measure carbon emissions in the next 2 years and reduce the carbon footprint by 30% during the CCP planning horizon. In total, implementing these measures would help the Service meet its Climate Change policy objectives for reducing the carbon footprint of refuge staff activities. In any event, the overall net effect on emissions from all activities under Alternative B would result in a minor adverse impact to air quality relative to Alternative A, given the adoption of BMPs previously discussed (see Appendix 1 of the EA).

4.2.2.3 Alternative C

Implementing Alternative C would result in minor adverse effects to air quality. Under Alternative C, similar minor adverse effects to air quality previously described for Alternative B would occur from implementing habitat management measures and the IPM Plan. However, Alternative C would not include carbon emission reduction measures and other “green” activities to reduce the carbon footprint of refuge activities. Alternative C would include additional pile burning to expand the fire break system for condor roosting sites, resulting in additional particulate and carbon emissions relative to Alternatives B and C. In addition, there would be added volunteer activities under Alternative C, which would increase PM₁₀, ROG, NO_x, and carbon emissions. The overall net effect of emissions from all activities under Alternative C (e.g., additional pile burning from increased vehicle and equipment emissions [visitors, volunteers, and workers]) would result in a minor adverse impact to air quality relative to current management activities and visitor access under Alternative A.

4.2.3 Noise – Bitter Creek NWR

4.2.3.1 Alternative A – No Action

There is a minor direct effect of current activities under Alternative A on noise levels in the vicinity of Bitter Creek NWR. The general public in the vicinity of access roads to Bitter Creek NWR may experience minor changes in noise due to activities associated with management actions at the refuge, including use of vehicles (e.g., on-road cars and trucks) for refuge access associated with condor and habitat management activities by refuge personnel and contractors, and vehicle use for limited visitor and volunteer access. Given the refuge’s remote location and restricted access, only minor changes in traffic related noise would occur. Furthermore, these noise effects are similar to levels experienced by these

residents from other traffic along these access roads. Sensitive receptors and the general public located along major access routes to the refuge (i.e., schools, churches, clinics, and residents along major access roads to the refuge [Route 33/166 and Cerro Noroeste Road]) would not experience any appreciable differences in traffic related noise levels, given that the refuge is closed to the general public.

4.2.3.2 Alternative B

Increased management and visitor activities under Alternative B would result in limited increases in local traffic, which would result in minor increases in noise levels during certain time periods for a short duration for receptors residing near access roads to the Bitter Creek NWR. In particular, opening an interpretative trail at Klipstein Canyon, expanded outreach activities, expanded volunteer programs, adding an additional condor observation point off Cerro Noroeste, and providing year-round public access to limited portions of the refuge would increase visitation to the refuge and associated traffic related noise. Given the remote location of the refuge and limited number of public access points, only minor changes in traffic related noise would occur. The increase in noise would be minor relative to current management activities and visitor access under Alternative A. However, these noise effects are similar to levels experienced by residents from other traffic along these access roads.

4.2.3.3 Alternative C

Increased management and visitor activities under Alternative C would result in limited increases in local traffic, which would result in minor increases in noise levels during certain time periods for a short duration for receptors residing near access roads to the Bitter Creek NWR. Under Alternative C, similar minor adverse effects to noise levels previously described for Alternative B would occur, although slightly greater traffic may occur from enhanced volunteer and outreach efforts. In any event, given the remote location and limited public access, only minor changes in traffic related noise would occur relative to current management activities and visitor access under Alternative A.

4.2.4 Water – Bitter Creek NWR

4.2.4.1 Alternative A – No Action

Continuation of current refuge management practices would have no impact on hydrology and only short-term, localized minor adverse effects on water quality from increased turbidity during soil disturbing activities. There would be no change in the overall extent of vegetation cover and water management, thus there would be no change in hydrology from continuation of current management measures. Maintenance activities would continue under Alternative A to include road maintenance and limited vegetation clearing, thinning, mowing, and disking for reducing fuel loads, maintaining fire breaks, invasive species removal, and trail maintenance. Such actions would temporarily expose soils, resulting in increases in soil erosion, runoff, and localized increases in turbidity levels. In addition, vehicle access and heavy equipment usage may increase the potential for small releases of oils, grease, and other petroleum products. Soil erosion control measures, avoidance of riparian and wetland habitat, adherence to Service regulations and policy, and BMPs discussed in Appendix 1 of the EA would reduce potential effects to water quality, resulting in only short-term minor adverse effects to water quality. As such, only minor adverse effects to water quality would occur as a result of implementing such actions.

As previously discussed, Service-approved herbicides/pesticides would be used as part of an IPM plan for controlling pests. Pesticides used at Bitter Creek NWR include: Transline application on approximately 25 acres and Pathfinder II application on approximately 35 acres. The active ingredient in Transline, clopyralid, has limited mobility in soils where studies have shown that average movement of the herbicide was 11 inches, with no detectable residue in leachate, indicating very little potential for surface or groundwater contamination (Cornell University 2012). The active ingredient of Pathfinder II, triclopyr BEE does not persist in water, with detected levels of metabolites in surface water dissipating rapidly with half-lives of 0.5 to 3.5 days (USFS 2011b). In any event, there were no risks from exposure to low levels of metabolites that may occur in surface water following terrestrial application under various worst case herbicide application scenarios tested by the U.S. Forest Service (USFS 2011b). In accordance with BMPs (see Appendix 1 of the EA), the Service would maintain unsprayed buffer areas near aquatic

habitats and other sensitive areas. In addition, the Service would avoid application of pesticides where seasonal precipitation or excess irrigation water is likely to wash residual toxic substances into waterways. Furthermore, herbicide/pesticide treatments for the control or removal of invasive plants in riparian/wetland areas must be limited to hand or wick applications by qualified personnel. All chemicals would be handled in strict accordance to label specifications and applied in consideration of persistence, soil/water mobility, toxicity, and plant update. The Service would also adhere to all EPA and California EPA warning labels and application requirements, as well as the Service's PUP process regulations. This highly regulated and integrated process carefully considers the environmental hazards, efficacy, costs, and vulnerability of the pesticide being used. Given this process and their limited use, the Service concludes that the use of pesticides would have a negligible adverse effect on water quality, while providing a net beneficial effect to biological resources as noted in the sections to follow.

4.2.4.2 Alternative B – Preferred Alternative

Implementing Alternative B would have a minor adverse effect on water quality and a minor positive effect on hydrology. Under Alternative B, more intensive habitat management and invasive species control measures would be implemented (as further discussed in section 4.2.5), along with small scale construction and restoration projects to support condor management (e.g., facility construction and restoration projects), visitor service projects (refuge offices, visitor contact station, kiosk, and parking), trail establishment and maintenance (e.g., 1-mile loop trail off Klipstein Canyon), and road maintenance (e.g., removing and redesigning runoff control measures). In addition, the Service would implement restoration projects to restore natural spring flow in 3 subdrainages within 6 watersheds at Bitter Creek NWR. There would be a reduction and modification to existing water control structures to restore these natural flows of water except as needed for fire suppression, bunkhouse use, and prescribed livestock grazing needs. Prescribed grazing can also result in compaction of soils resulting in increased surface water runoff and erosion, as well as exposing soils from trampling and vegetation removal (Blackburn 1975; Gifford and Hawkins 1978; Roberson 1996). These activities would increase the potential for short-term, localized exposure of bare soils resulting in increased soil erosion, runoff, and turbidity in receiving water bodies. Exclusionary fencing would be used to protect riparian areas and wetlands from livestock grazing impacts. Furthermore, a comprehensive water resources inventory of springs and wetlands would be performed (including water quality), which would inform adaptive management of grazing prescriptions and permits to reduce adverse impacts. Implementation of BMPs outlined in Appendix 1 of the EA would reduce these effects to water quality, resulting in only minor adverse effects. On the other hand, closing portions of the water control system, closing associated road networks, reducing road erosion problems, and habitat restoration efforts would result in long-term positive effects on hydrology and water quality. In addition, riparian and wetland habitat management and restoration would increase the filtering capacity of this habitat, thereby resulting in additional long-term improvements in water quality. Overall, there would be minor, short-term adverse impacts to water quality and positive long-term impacts to both water quality and hydrology from implementing Alternative B relative to Alternative A.

4.2.4.3 Alternative C

Under Alternative C, similar minor adverse and positive effects to water quality and hydrology previously described for Alternative B would occur from implementing Alternative C. Under this alternative, the IPM would not include the use of chemical methods for controlling non-native species, invasive species, and noxious weeds, which would reduce some of the adverse effects to water quality. In addition, Alternative C would remove all water diversions (except as needed for fire suppression and bunkhouse use) and close additional road networks, as well as more aggressively remove tamarisk, which would further improve hydrology and water quality across Bitter Creek NWR as compared to Alternatives A and B in the long term. On the other hand, Alternative C would include additional soil disturbance activities associated with more intensive grassland habitat restoration measures, short-term effects of tamarisk removal, establishing fire breaks around condor roosts, and additional small scale construction and trail establishment (e.g., turn-out, parking, and trail on Cerro Noroeste Road). This activity would result in short-term, localized adverse effects to water quality from increased turbidity in the project areas. These impacts would be minimal given implementation of BMPs, as outlined in Appendix 1 of the EA. Overall, there would be minor, short-term adverse impacts to water quality and positive long-term impacts to both

water quality and hydrology from implementing Alternative C relative to Alternative A. In general, Alternative C would result in slightly more intense effects to water quality and hydrology as compared to Alternative B due to the added scope of habitat and riparian restoration efforts.

Effects on the Bitter Creek NWR Biological Environment

4.2.5 Vegetation – Bitter Creek NWR

4.2.5.1 Alternative A – No Action

Overall, there would be no appreciable impact to plant communities from continuation of current management activities under Alternative A, given the limited habitat management that occurs at Bitter Creek NWR other than for supporting the California condor recovery effort. Limited vegetation clearing, mowing, and disking would continue for reducing fuel loads and maintaining fire breaks, roads, and trails. Such actions would prevent re-growth of vegetation in these areas; however, there would be no net change in the plant communities or extent of vegetation cover that currently exists. In the long term, wildfire prevention measures may reduce the probability for more severe wildfires from occurring (which could result in reducing the risk of stand replacement of the dominant vegetation species and reducing vegetation biodiversity) (Telfer 2000). Opportunistic removal of invasive species (e.g., yellow star thistle (*Centaurea solstitialis* L.), non-native mustards (*Brassicaceae* species [e.g., *Sisymbrium* sp. (all non-native taxa) and *Hirschfeldia incana*]), and tamarisk using chemicals [Transline and Pathfinder II] and non-chemical control methods) would continue in the future, resulting in continued positive benefits to plant communities. Direct application of Pathfinder II and Transline to vegetation would have adverse effects to sensitive non-target plant species. Risk assessment studies have shown, however, that indirect exposure (e.g., spray drift or soil or wind erosion) using these herbicides would not be a concern under most spraying scenarios (USFS 2004; USFS 2011b). Applying herbicides during calm weather conditions with sufficient buffers would reduce adverse effects to non-target species outside of the application area.

4.2.5.2 Alternative B – Preferred Alternative

Implementing Alternative B would have minor positive and negative effects on native plant species and plant communities, with the potential for localized moderate positive and negative effects. Under Alternative B, a step-down grassland HMP would be implemented that would result in active management and restoration of up to 9,000 acres of grasslands (i.e., increased mowing, vegetation clearing, prescribed grazing, and herbicides) and expanded grassland management to achieve a mosaic of grassland structure primarily to support special status species. The mosaic would consist of approximately one-third of the acreage as short grass habitat (heights 1 to 3 inches), one-third medium grass habitat (6 to 10 inches), and one-third tall grass habitat (12 to over 30 inches). The HMP would employ a range of management measures, including prescribed grazing, disking, mowing, seeding with native species, and chemical controls (Transline and Pathfinder II or similar) for achieving goals for habitat management and invasive species control. Specifically, up to 9,000 acres would be comprised of (and the grassland HMP would seek to maintain and restore) short grass habitat for San Joaquin Valley special status species in certain areas (up to 1,300 acres of grassland habitat), while maintaining a mosaic of grassland types in other areas (in targeted areas across up to 7,000 acres of grassland habitat at the refuge), as well as seek to provide benefits to federally-listed and special status species, as well as California Partners in Flight focal species (CalPIF 2000; CalPIF 2002a; CalPIF 2004; RHJV 2000; Siegel and DeSante 1999; USFWS 1998).

Prescribed grazing (e.g., cattle) would be utilized as one of many techniques to potentially reduce targeted weeds and plant biomass, as necessary, to achieve mosaic grassland objectives, as outlined in Appendix H. Although prescribed grazing may provide long-term benefits as an important tool for restoring short grass and mosaic grassland habitat types, this strategy can generate both positive and negative effects to native plants and plant communities (see section 4.2.7 for discussion of rare plants and special status species). Results of scientific studies on the effects of grazing has shown that successful results are very site-specific and can depend on the interaction between site conditions (e.g., soil type), weather, and grazing practices (Briske et al. 2011, Kimball and Schiffman 2003, Stahlheber and D'Antonio 2013,

Huntsinger et al. 2007, Bartolome et al. 2009). Such site-specific studies are lacking in the study area relative to the type of prescribed grazing being proposed; therefore, there is a degree of uncertainty as to what effect prescribed grazing would have on specific plants and vegetation in the area. As such, the Service has adopted an adaptive management strategy, with monitoring (RDM and refuge resource targets), to evaluate the effects of prescribed grazing on vegetation for each management unit, which will allow for adjustments to be made in grazing permits to mitigate adverse effects (e.g., stipulations related to timing, stocking density, type, access, maintenance, reporting, supplemental feeding, support equipment usage, livestock quarantine and origin restrictions [to reduce invasive species risk from livestock and vehicles used to transport livestock], and monitoring) (Bush 2006, Herrick et al. 2012). Such adverse effects would be mitigated by limiting grazing to targeted resource prescriptions, grazing permit restrictions, and other adaptive management techniques based on monitoring both RDM and refuge resource targets. Such methods have been used successfully to manage grazing intensity and distribution, as well as for determining carrying capacity (Bartolome et al. 2006, McDougald et al. 1991). Overall, habitat manipulation through prescribed grazing would likely have adverse effects on certain species or groups, while simultaneously providing some beneficial effects to other species or groups. Thus, the effects depend on the frame of reference and would be highly site-specific (Jackson and Bartolome 2007). Cattle are generalist herbivores that prefer grasses of the California annual-type grassland (Van Dyne and Heady 1965), and certain forbs and legumes may benefit from reduction of non-native annual grass biomass, including standing dead plant material and thatch (Huenneke et al. 1990).

Potential adverse effects of grazing on grasslands and riparian areas include: introduction of non-native and invasive species; trampling sensitive species; trampling of vegetation; trench creation; wallowing during resting; habitat fragmentation; creating gaps for invasive species; overgrazing; habitat fragmentation; soil disturbance (compaction, disruption of soil crusts, and exposure to erosion); reduction in soil mycorrhizae; preferential grazing of perennials over annuals; adverse effects from feces that can smother plants; and riparian damage (as cited in Lacey 1987; Schiffman 1997; Belnap et al. 2001; Belsky and Gelbard 2000; Jones 2001; CalPIF 2000; Ellison 1960; Holland and Keil 1995; Krueper 1993; Taylor and Davilla 1986; USFWS 1998; Van Dyne and Heady 1965). These adverse effects may be partially mitigated through implementing monitoring and adaptive management measures and restrictions measures, including: erecting temporary electric exclusionary fences to prevent riparian, wetlands, and shrub habitat damage; adherence to restrictions and permit conditions outlined in SUPs (e.g., livestock quarantines and location restrictions to reduce the risk of introducing invasive species from livestock and vehicles used to transport livestock [Bush 2006]); monitoring to reduce the potential for overgrazing effects; and controlled access (see Appendix C of the CCP for list of grazing restrictions). The Prescribed Grazing Plan would utilize adaptive management (considering the potential effects of climate change), research, monitoring, and grassland restoration techniques to ensure that all management regimes achieve intended goals and objectives for grassland habitat. This effort would be enhanced and guided using the adaptive management process, to include consideration of additional research, inventorying, and monitoring.

Although research efforts have the potential to provide some positive benefits by improving management decisions, certain research projects may have short-term, localized, minor adverse effects (e.g., vegetation removal, human activity, soil disturbance), which would be controlled and monitored as part of a SUP with specified permit conditions and enforcement to minimize effects.

As part of Alternative B, an IPM Plan would be implemented, which includes early detection monitoring and biological, chemical, and targeted mechanical management measures (to include prescribed grazing in upland areas) for the control of non-native species, invasive species, and noxious weeds in existing grasslands, riparian, and wetlands in targeted areas. The objective of the Service is to reduce by 25% the coverage of targeted nonnative invasive species on the refuge, including yellow star thistle and non-native mustards. Overall, implementation of the step-down IPM Plan would result in positive impacts to vegetation habitat quality, although further research is needed to evaluate impacts and success rates. In addition to the IPM Plan, native vegetation plantings in riparian and wetlands would occur, which would improve habitat quality and resilience to non-native species invasions. In addition, control of invasive

animals, such as feral swine as part of the IPM would have an indirect benefit to plant communities. With respect to herbicide applications, direct application of Pathfinder II and Transline or similar herbicides to vegetation would have adverse effects to sensitive non-target plant species within treated areas. Modeling and risk assessment studies have shown that indirect exposure (e.g., spray drift) using these herbicides would not be a concern under most spraying scenarios to nontarget species (USFS 2004; USFS 2011b). Pathfinder II may be a concern to non-target vegetation due to spray drift if applied during windy conditions. Applying these herbicides in accordance with label instructions during calm weather periods with low potential for drift, along with sufficient buffers, would reduce adverse effects to non-target species outside of the application area.

Minor positive indirect effects to riparian vegetation would occur from road maintenance and runoff control measures to prevent severe erosion and from restoring water flows from removing and redesigning existing water control structures that divert surface water flows. The closure of certain road networks that are used to service the water control system would also provide positive benefits by restoring vegetation habitat and connectivity. In addition, Alternative B would include additional monitoring and management of riparian areas and vernal pools, which would generate additional positive benefits in the long term. In the woodland communities, proposed habitat management measures under Alternative B would likely improve habitat quality by improving regeneration, controlling invasive species (tree of heaven eradication), and adaptively managing stands considering the potential effects of climate change. Monitoring and adaptive management strategies are necessary to verify that management objectives are achieved.

Construction projects for condor management and observation (condor flight pen, 1,000-square-foot condor treatment facility, RV hook-ups, pull-out condor observation point, and roost management), wind/rain gauge weather station installation, removal and construction of fencing (about 20 miles), and volunteer and visitor programs (refuge offices, visitor contact station, kiosk, trail establishment, and parking) would have very localized minor adverse impact to vegetation that must be cleared. All construction projects would disturb less than an acre of habitat, while fence clearing may disturb approximately 5 to 10 acres of habitat. On the other hand, expanded volunteer programs would provide additional labor to assist the Service in achieving vegetation management goals for improving and conserving native plant species and plant communities.

There is uncertainty as to the net effect on vegetation from all management activities under Alternatives B given the lack of scientific research at Bitter Creek NWR. Although certain management measures may have localized, short-term minor adverse impacts on certain plant communities and non-target species as noted (e.g., prescribed grazing, clearing, disking, and herbicide treatment), it is hypothesized that there would be long-term benefits in habitat productivity and biodiversity resulting in net positive effects to native plants and plant communities, but further research and monitoring are needed to evaluate these net effects. Overall, impacts would range from minor to moderate, with both positive and negative effects relative to Alternative A. Given this uncertainty, vegetation impacts will be managed through an adaptive management process in order to mitigate adverse impacts.

4.2.5.3 Alternative C

Under Alternative C, minor positive and negative effects on native plant species and communities, with the potential for localized moderate positive and negative effects would occur, similar to those described for Alternative B from implementation of a step-down grassland HMP and IPM Plan. This alternative includes more intense short grass and mosaic habitat restoration and increased tamarisk removal in riparian areas as compared to Alternative B (i.e., approximately 5 acres of additional tamarisk removal), thereby generating additional positive benefits. The IPM Plan would not include the use of chemical methods for controlling non-native species, invasive species, and noxious weeds, which would reduce some of the positive benefits and effectiveness of the program for achieving management goals (e.g., removal of star thistle, non-native mustards, and tree of heaven). As a result, there is uncertainty as to whether the Service will be able to meet its goals and objectiveness for control of invasive species. In addition, Alternative C would eliminate all water diversions and stock tanks (except as needed for fire

suppression and bunkhouse use), as well as provide for additional planting/seeding of native riparian plants, which would further help restore natural hydrology and riparian habitat generating positive benefits to vegetation in these communities. Alternative C would also create additional fire breaks around condor roosting sites and establishment of a condor interpretative hiking trail near Cerro Noroeste Road, which would result in minor disturbance and removal of vegetation around these locations.

As previously discussed, there is uncertainty as to the net effect on vegetation from all management activities under Alternatives C given the lack of scientific research at Bitter Creek NWR. Furthermore, it is unknown whether the more intensive grassland and riparian habitat management measures proposed under Alternative C will benefit these habitats more than measures proposed for Alternative B due to the uncertainty as to whether or not invasive species can be adequately controlled without the use of chemical control measures, as proposed for Alternative C; further research is needed. Overall, impacts would range from minor to moderate, with both positive and negative effects relative to Alternative A.

4.2.6 Wildlife Resources – Bitter Creek NWR

4.2.6.1 Alternative A – No Action

Under this alternative, we would continue to implement habitat management that focuses on supporting the California condor recovery effort. These management efforts include continued habitat management for the California condor, opportunistic removal of fencing and replacement with wildlife-friendly fences, control of certain invasive species, and monitoring activities. In addition to the California condor, these management efforts may directly benefit many species of wildlife, including ungulates such as mule deer (*Odocoileus hemionus*), tule elk (*Cervus canadensis* ssp. *nannodes*), and pronghorn antelope (*Antilocapra americana*), which provide additional forage for condors. In addition, fuel load reductions to prevent wildfires would continue to protect woodland habitat utilized by many species of birds and mammals. Also, limited habitat management to control fuel loads near roads and facilities would maintain current habitat conditions for wildlife. In the long term, continued implementation of fire prevention measures may prevent more severe adverse long-term impacts to wildlife from occurring by reducing the potential for more destructive wildfires. Severe wildfires can eliminate important habitat for many species of birds and small mammals, expose wildlife to predators, and reduce browsing opportunities for some wildlife for many years (CalPIF 2000; CalPIF 2002a; CalPIF 2004; Lyon et al. 2000a,b). Although severe wildfires may eliminate habitat for some species, they can create habitat for others. Given the limited vegetation management that occurs at Bitter Creek NWR, current management (Alternative A) would continue to provide moderate to low quality grassland habitat, and moderate quality woodland and riparian habitat for a variety of migratory and resident wildlife.

4.2.6.2 Alternative B – Preferred Alternative

Implementing Alternative B would have a long-term, minor to moderate positive effect for a variety of targeted wildlife resources, with the potential for some local, minor to moderate adverse effects to other non-targeted wildlife species. Under Alternative B, several measures would be implemented to improve and restore habitat quality at Bitter Creek NWR, including: 1) implementing a step-down grassland HMP for improving short grass habitat and mosaic habitat; 2) expanded monitoring for birds in riparian and wetlands habitat; 3) additional staffing for enforcement, management; 4) expanded research for better decision making (with associated SUPs to minimize any short-term effects); 5) expanded IPM management; 6) restoration of hydrology and erosion control measures benefiting aquatic life and riparian species; 7) replacement and installation of wildlife-friendly fencing improving movement of ungulates and other large species; 8) expanded I&M to enhance management of ungulates; 9) installation of fences to prevent overgrazing; 10) road closings to increase habitat connectivity; and 11) implementing a step-down woodland HMP. Implementing the grassland HMP would restore and maintain a mosaic of grassland heights across up to 9,000 acres, which would provide benefits to a range of special status species and California Partners in Flight focal bird species (Fuhlendorf et al. 2006; Shuford and Gardali 2008) as outlined in California Partners in Flight Bird Conservation Plans (CalPIF 2000; CalPIF 2002a; CalPIF 2004; RHJV 2000; Siegel and DeSante 1999). For example, taller grasses may support northern harrier (MacWhirter and Bildstein 1996) and grasshopper sparrow (CalPIF 2000), medium grass heights

may support the short-eared owl (Wiggins et al. 2006), and the short grasses may support western burrowing owl (Green and Anthony 1989; Haug et al. 1993) and prairie falcon (Steenhof 1998). In addition, many Neotropical songbirds may benefit, including grasshopper sparrow and wintering Oregon vesper sparrows. In the woodlands, habitat restoration efforts may potentially benefit many bird species including Nuttall's woodpecker, oak titmouse, loggerhead shrike (*Lanius ludovicianus*), and western bluebird (*Sialia mexicana*) (CalPIF 2002a) (see section 4.2.7.2 for further discussion). Although many habitat management measures would result in short-term, minor adverse impacts and localized disturbances from human activity, in the long term, these measures may provide net positive effects for many species of wildlife that utilize grassland (short grass, mosaic), riparian, wetland, and woodland habitat, including many species of migratory birds (CalPIF 2000; CalPIF 2002a; CalPIF 2004; RHJV 2000; Siegel and DeSante 1999). Monitoring and adaptive management strategies would be utilized to determine whether these habitat measures benefit targeted wildlife species as planned, and to adjust the plan as necessary to enhance effectiveness and minimize adverse effects.

Expanded habitat management, I&M measures, and fencing replacement may benefit ungulates such as mule deer, tule elk, and pronghorn antelope, which would provide additional forage for condors. For fencing, non-barbed wire fencing would be used for the top and bottom wires of the fence in order to protect small mammals and ungulates that may move over or under the fence (Gross et al. 1983, Gates et al. 2011). Replacement of old fencing will enhance movement of elk and antelope across the landscape and reduce injury resulting in positive effects. Additional coordination with neighboring Wind Wolves Preservation will allow for additional monitoring of population and trends for large ungulate populations. Habitat management measures may also result in minor adverse effects to certain species that favor current habitat conditions. In addition, many habitat restoration and management measures would cause temporary, localized, minor adverse effects to wildlife as a result of vegetation removal, herbicide application, soil disturbance, and human activity further discussed here.

As previously discussed, Pathfinder II and Transline would be used to control invasive species. Application of Transline does not pose a concern for wildlife based on a range of application and dose response scenarios tested by the U.S. Forest Service (USFS 2004). Incidental spray and spray drift from backpack application of Pathfinder II may expose non-target wildlife that consume treated vegetation or insects, including birds, small mammals, and ungulates (USFS 2011b). Potential non-lethal acute and chronic effects have been noted for birds and small mammals, as well as ungulates, under certain worst case application scenarios involving broad foliar application of Pathfinder II (USFS 2011b). However, at Bitter Creek NWR the potential for exposure to wildlife would be very low as Pathfinder II would be applied to tamarisk tree stumps and the girded cuts in tamarisk tree trunks, not on foliage. Broader foliar application and aerial spraying would not be conducted at Bitter Creek. Nonetheless, incidental spraying and spray drift does have the potential to cause short-term, localized, minor adverse effects to non-target wildlife species from consumption of foliage or insects contaminated by spray drift or incidental spray. To further reduce the potential for exposure, spraying would be done in the winter to limit the potential for contamination of non-target foliage and insects that could be consumed by wildlife. In addition, the small area of application (0.25% of the area of the refuge, on up to 35 acres for tamarisk removal) and the short half-life for the active ingredient in the environment would further limit the effects of incidental spraying and spray drift to wildlife. Thus, application of Pathfinder II may have a minor short-term adverse effect to wildlife at the refuge (USFS 2011b), while long-term positive benefits would occur from invasive species control and improved habitat quality.

Overall, prescribed grazing may have both positive and adverse minor effects to wildlife of Bitter Creek NWR. Generally, beneficial effects would occur to species favoring open, short grass habitat, while negative effects may occur to species favoring denser vegetation and taller grasses. For example, grassland habitat restoration achieved through prescribed grazing may benefit western burrowing owl (Green and Anthony 1989; Haug et al. 1993) and prairie falcon (Steenhof 1998), which prefer shorter grasses. Based on available trends data, species in the San Joaquin Valley that may benefit from grazing include the horned lark (*Eremophila alpestris*), short-nosed kangaroo rat (*Dipodomys nitratoides brevinasus*), sideblotched lizard (*Uta stansburiana*); and western whiptail (*Cnemidophorus tigris*), while

species that may prefer ungrazed areas include the western meadow lark (*Sturnella neglecta*), Heermann's kangaroo rat (*Dipodomys heermanni*), and San Joaquin pocket mouse (*Perognathus inornatus*) (Germano et al. 1997; Boarman et al. 2001). Potential adverse effects of livestock grazing on wildlife habitat include: proliferation of non-native and invasive species; trampling of vegetation; trench creation; wallowing during resting; habitat fragmentation; creating gaps for invasive species; overgrazing; habitat fragmentation; soil disturbance (collapsing burrows, compaction, disruption of soil crusts, and exposure to erosion); reduction in soil mycorrhizae; preferential grazing of perennials over annuals; potential adverse effects on ungulate populations; and riparian damage (as cited in Belnap et al. 2001; Belsky and Gelbard 2000; Gogan and Barrett 1987; Jones 2001; CalPIF 2000; Ellison 1960; Holland and Keil 1995; Kie et al., 1991; Krueper 1993; Lacey 1987; Loft et al. 1991; Schiffman 1997; Stewart et al. 2002; Taylor and Davilla 1986; USFWS 1998; Van Dyne and Heady 1965, Zambrano 1998).. In addition, livestock have the potential to crush burrows used by the western burrowing owl, as well as the California ground squirrel and other small mammals (Zambrano 1998). Livestock grazing also has the potential to adversely affect ground-nesting birds and habitat quality (CalPIF 2000; Holland and Keil 1995; Krueper 1993; Taylor and Davilla 1986; USFWS 1998).. The Service would apply an adaptive management approach and I&M (e.g., breeding bird surveys, point count stations, raptor observations, and periodic survey routes for migratory birds, and small mammal trapping for small mammals) to evaluate the long-term effects of habitat changes and prescriptions (i.e., prescribed grazing methods) to ensure that the refuge goals and objectives are achieved, maximizing benefits for native wildlife species and special status species (when present), as discussed in section 4.2.7.

Under Alternative B, the partial opening of the refuge to public use and expanded outreach would have localized, short-term minor adverse impacts on wildlife from increased human activity (e.g., opening Klipstein Canyon road trail), yet such effects would be mitigated through adaptive management (e.g., closure of trails and areas as needed to protect sensitive wildlife). Expanded volunteer programs would provide additional labor to assist the Service in achieving habitat and wildlife management goals, although short-term, localized minor disturbances to wildlife may occur from volunteer efforts as well. Human activity during wildlife photography, observation, and volunteer activities has the potential to alter wildlife behavior (e.g., modify singing in birds, repeated flushing), increase energy expenditures, reduce reproductive success, alter distributions, reduce habitat quality, and serve as vectors of invasive species (Belanger and Bedard 1990; Dobb 1998; Glinski 1976; Gutzwiller et al. 1997; Klein 1993; Knight and Cole 1995; Miller et al. 1998; Morton 1995; Morton et al. 1989; Purdy et al. 1987; Smith and Hunt 1995). These effects would be minor, short-term and localized given the availability of only 1 public trail, expected low levels of visitation to the refuge, and adherence to the restrictions in the compatibility determinations for refuge access (e.g., access restricted to trails and designated areas and specific time periods, no dogs, avoidance of sensitive areas to minimize impacts to wildlife [e.g., avoiding areas near condor nests sites, feeding stations, and trapping sites]) (see also Appendix C of the CCP). To reduce adverse effects associated with increased traffic, the Service would also partner with other transportation agencies to add signage at wildlife crossings to reduce wildlife mortality strikes.

Long-term positive indirect effects may also occur for aquatic life and riparian species from road maintenance and runoff control measures to prevent severe erosion and head-cutting, as well as increase in water flows from partial closure of various water control structures. Restoring natural water flows to many riparian areas and wetlands would benefit many species of birds, reptiles, amphibians, mammals, and migratory birds. The closure of certain road networks that are associated with servicing the water control system would also provide positive benefits to most wildlife species that utilize habitat in these areas. In addition, control of invasive animals, such as feral swine as part of the IPM, would have direct and indirect benefits to native wildlife species, such as control of vector borne diseases that can kill mountain lions (*Puma concolor*) and conservation of riparian and wetland habitat.

Overall, the net effect on wildlife resources from all management activities under Alternatives B would result in net minor to moderate positive impact to most targeted wildlife resources in the long term relative to Alternative A, with the potential for some local minor to moderate adverse effects to other non-targeted wildlife species.

4.2.6.3 Alternative C

Implementing Alternative C would have a long-term, minor to moderate positive effect on targeted wildlife resources, with the potential for some local, minor to moderate adverse effects to other non-targeted wildlife species. Under Alternative C, similar positive benefits to wildlife previously described for Alternative B would be achieved through implementation of a step-down grassland HMP and IPM Plan. This alternative includes more intense short grass and mosaic habitat restoration and increased tamarisk removal in riparian areas (5 additional acres) as compared to Alternatives A and B, thereby generating additional positive benefits to wildlife that utilize these areas. Alternative C would eliminate all water diversions and stock tanks (except as needed for fire suppression and bunkhouse use), as well as provide for additional planting/seeding of native riparian plants, which would further help restore natural hydrology and riparian habitat, generating positive benefits to aquatic life and riparian wildlife in these areas. Alternative C would also create additional fire breaks around condor roosting sites and establishment of a condor interpretative hiking trail near Cerro Noroeste Road, which would result in minor human disturbances and removal of some habitat utilized by wildlife in these locations. Overall, the net effect on wildlife resources from all management activities under Alternative C would result in minor to moderate positive impacts to targeted wildlife species relative to Alternative A, with the potential for some local, minor to moderate adverse effects to other non-targeted wildlife species. In general, Alternative C would afford more long-term positive benefits to the wildlife utilizing grassland and riparian communities (due to enhanced restoration efforts), as well as to aquatic life (due to reduction in water diversions), as compared to Alternative B.

4.2.7 Special Status Species – Bitter Creek NWR

As discussed in special status species section of the CCP, there is the potential for over 50 special status species of plants to occur at Bitter Creek NWR based on habitat types, with the following species known to occur within the refuge, including 1 federally-listed species, the endangered Kern mallow (*Eremalche parryi* subsp. *kernensis*). The California jewelflower (*Caulanthus californicus*) and the San Joaquin woolly-threads (*Monolopia congdonii*) are two other federally-listed, endangered plants that may occur on Bitter Creek NWR. Other special status species that are not federally-listed, include: California androsace (*Androsace elongata* subsp. *acuta*), CA Rare Plant Rank 4.2; Mojave paintbrush (*Castilleja plagiotoma*), CA Rare Plant Rank 4.3; Lemmon's jewelflower (*Caulanthus coulteri* var. *lemmonii*), CA Rare Plant Rank 1B.2; gypsum-loving larkspur (*Delphinium gypsophilum* subsp. *gypsophilum*), CA Rare Plant Rank 4.2; stinkbells (*Fritillaria agrestis*), CA Rare Plant Rank 4.2; cuyama gilia (*Gilia latiflora* subsp. *cuyamensis*), CA Rare Plant Rank 4.3; tall silky lupine (*Lupinus elatus*), CA Rare Plant Rank 4.3; and Adobe yampah (*Perideridia pringlei*), CA Rare Plant Rank 4.3. A list of special status species is provided in Appendix E to the CCP.

Two federally-listed as endangered species are known to occur on Bitter Creek NWR: California condor and San Joaquin kit fox. Potential habitat for the blunt-nosed leopard lizard (*Gambelia (Crotaphytus) sila*) and giant kangaroo rat (*Dipodomys ingens*) exists on the refuge. Surveys would be needed to determine if these species are present on the refuge. Other federally-listed species for which there may be habitat, but the species have not been documented at the refuge are: the federally-listed as threatened valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*), and vernal pool fairy shrimp (*Branchinecta lynchi*). Based on their range and lack of habitat, the endangered Buena Vista Lake shrew and the threatened California red-legged frog are not expected to occur on the refuge.

The tricolored blackbird (*Agelaius tricolor*) is a state-listed special status species that utilizes Bitter Creek NWR for colonial nesting. The western burrowing owl is a federal and state-listed species of concern that occurs at the refuge.

Conservation of Concern and California Partners in Flight focal species, including grasshopper sparrow, northern harrier, olive-sided flycatcher (*Contopus cooperi*), tricolored blackbird, Vaux's swift (*Chaetura vauxi*), vesper sparrow (*Pooecetes gramineus*), loggerhead shrike (also a California Species of Special Concern), Bewick's wren (*Thryomanes bewickii*), black-headed grosbeak (*Pheucticus melanocephalus*), Bullock's oriole (*Icterus bullockii*), California thrasher (*Toxostoma redivivum*), cactus wren, Costa's

hummingbird, greater roadrunner, Lawrence's goldfinch (*Carduelis lawrencei*), Nuttall's woodpecker, oak titmouse, spotted towhee (*Pipilo maculatus*), wrenit, black-chinned sparrow, sage sparrow (*Amphispiza belli*), and rufous-crowned sparrow (CalPIF 2000; CalPIF 2002a; CalPIF 2004).

4.2.7.1 Common to All Alternatives

To avoid, minimize, and reduce adverse impacts to special status species, several BMPs have been developed as further detailed in Appendix 1 of the EA. For example, for all alternatives, the following BMPs would be employed to protect special status species when threatened by proposed activities: 1) using an adaptive management approach, trails, roads, and/or areas would be closed to ensure that human access does not disturb special status species; and 2) prior to habitat and ground disturbing activities, potential habitat for special status species would be evaluated and, if appropriate, presence/absence surveys and additional mitigation measures taken (e.g., avoid location, change timing of action), if necessary, to ensure that planned activities do not disturb special status species. In addition, the Service would comply with all terms and conditions resulting from Section 7, Endangered Species Act consultation when specific projects are undertaken.

4.2.7.2 Alternative A – No Action

Current management would continue to have a positive effect on the California condor and other special status species under Alternative A. California condors would continue to benefit from intensive recovery efforts at Bitter Creek NWR, including: condor treatment and recovery efforts, fire protection measures, feeding sites, habitat management, disturbance prevention, and ranch coordination. Visitor tours and volunteer efforts would continue to be monitored, with access limited to areas that would not disturb condors. Fuel loads reductions to prevent wildfires would also continue to reduce the potential for fire damage to woodland habitat that may be utilized by special status species (CalPIF 2002a). For example, severe wildfires can reduce important habitat for ungulates that condors may feed on, as well as consume important roosting trees (Lyon et al. 2000c, Tesky 1994). In addition, invasive species control in grassland, riparian, and wetlands habitat, along with some monitoring efforts, would provide positive benefits to special status species that inhabit those areas, such as tricolored blackbird colonies.

4.2.7.3 Alternative B – Preferred Alternative

Implementing Alternative B would result in moderate positive impacts to the California condor. Although the primary focus of habitat management would no longer be the condor, under Alternative B, several enhanced condor management activities would be utilized to increase survivorship, including: 1) expanded population monitoring capabilities; 2) mapping and protection of roost sites; 3) upgrading support facilities and monitoring efforts; 4) enhanced volunteer programs and research (with associated SUPs to minimize any short-term effects); 5) enhanced coordination with regional partners (e.g., pursue possible land trades with BLM to consolidate management of the Headwall oaks roost site); 6) fencing replacement to enhance ungulate populations to increase food supply for condors; 7) coordination with ranchers to allow condors to feed on natural livestock mortalities and with hunters about leaving non-lead carcasses in the field; 8) I&M and habitat improvements to increase ungulate populations and forage for condors; 9) support research and monitoring efforts to identify and reduce the impacts to roost sites (e.g., fire and insects, including such effects exacerbated by climate change) and foraging habitat (e.g., climate induced changes in habitat and ungulate population interactions); 10) minimize structures that pose potential risks to condors, especially power lines; and 11) controlling microtrash through various outreach activities. Such efforts would provide a long-term moderate positive effect on condors and help achieve condor recovery goals. On the other hand, increased public access and volunteer programs would increase visitation to the refuge, which may increase the potential for human interactions. In the past, research has shown that captive bred condors may be more susceptible to human behavior causing higher potential for injury (Meretsky et al. 2000), although more recent research has shown that this effect has decreased as the wild population of condors becomes older (Cade et al. 2004). In any event, the Service would site the Klipstein Canyon loop trail specifically to minimize the potential for human disturbance, as the trail is located in low lying areas and away from ridges and high points. As a result, the trail presents less potential for human disturbance than other trails that are currently available on federal lands near condor habitat, such as trails at Pinnacles National Monument and nearby trails located off the refuge. With

respect to the planned condor pull-out, there are no roosting sites located nearby and habitat would be managed to eliminate potential roosting sites in the future near the pull-out to minimize potential for human disturbance of condors. In addition, increases in visitors (e.g., Klipstein Canyon road and additional condor observation location), guided visitor tours and volunteer outreach would be further mitigated by closing areas and trails as necessary to ensure that condors are not disturbed using an adaptive management approach. Potential adverse effects to California condor from prescribed grazing will be mitigated as discussed further below. Under Alternatives B, the net effect of all management activities would result in moderate positive impacts to the California condor relative to Alternative A.

For other special status species, additional habitat management, monitoring, and IPM approaches would be employed to benefit special status wildlife species, including: 1) development and implementation of a step-down grassland HMP and monitoring targeted to benefit special status species that utilize this habitat; 2) conducting presence and absence surveys for special status species in grassland and riparian/wetland habitat to determine if they are present, and if so, implement management measures to ensure protection (e.g., California red-legged frog); 3) development and implementation of a step-down HMP for woodland stands, which would benefit special status species if present; 6) restoration of hydrology and erosion control measures benefiting special status species that may be present in riparian habitat; 7) improve tricolored blackbird breeding habitat (e.g., exclusionary fences to fence out native grazers, as well as livestock to maintain vegetation cover and reduce the potential for soil disturbance; improve grassland habitat used for foraging near TBRL breeding colonies; encouraging nettles and willow growth near historic tricolored blackbird nesting areas; and road closings to expand habitat in several ecological communities); 8) increasing volunteer programs to support special status species projects; and 9) additional staffing for enforcement, management, and coordination efforts. Collectively, these efforts would result in long-term minor to moderate beneficial effects to targeted special status wildlife species, if successful, as well as potential for minor adverse effects, as further discussed below.

In the long term, management measures to enhance and restore mosaic grassland habitat through prescribed grazing (see Appendix H) may result in long-term positive benefits to special status species that utilize grassland areas to the extent that these measures achieve stated objectives. Due to a lack of site-specific research, it is uncertain to what extent these measures will generate the desired benefits to targeted special status wildlife species. Targeted special status species for this program include: the western burrowing owl, endangered blunt-nosed leopard lizard, endangered giant kangaroo rat, endangered Buena Vista Lake shrew, endangered San Joaquin kit fox, tricolored blackbird, and California Partners in Flight focal bird species (CalPIF 2000; CalPIF 2002a; CalPIF 2004; RHJV 2000; Siegel and DeSante 1999; USFWS 1998). Restoring and maintaining a mosaic of grassland heights may provide benefits to a range of special status species and California Partners in Flight focal bird species (Fuhlendorf et al. 2006; Shuford and Gardali 2008) as outlined in California Partners in Flight Bird Conservation Plans (CalPIF 2000; CalPIF 2002a; CalPIF 2004; RHJV 2000; Siegel and DeSante 1999). For example, taller grasses may support northern harrier (MacWhirter and Bildstein 1996), medium grass heights may support the short-eared owl (Wiggens et al. 2006), and the approximately 2,000 acres of short grasses may support a variety of San Joaquin special status species (e.g., the San Joaquin kit fox, giant kangaroo rat, blunt-nosed leopard lizard, and Nelson's antelope squirrel (*Ammospermophilus nelsoni*) [USFWS 1998, Larry Saslaw pers. comm.]), western burrowing owl (Green and Anthony 1989; Haug et al. 1993), prairie falcon (Steenhof 1998), and tricolored blackbird. Maintaining open grassland habitat has been shown to improve foraging habitat and population densities for grassland species, such as the black-chinned sparrow, Costa's hummingbird, rufous-crowned sparrow, and western burrowing owl (CalPIF 2004; Howard 1996), although opening the habitat may diminish habitat for species favoring denser scrub habitat (e.g., wrentits) (CalPIF 2004). In addition, maintaining and improving grassland habitat, through mechanical means and prescribed grazing, may enhance carcass access for California condors, as well as increase the availability of roosting snags (Tesky 1994).

The blunt-nosed leopard lizard and giant kangaroo rat can benefit from the openings in the vegetation created during prescribed grazing (USFWS 1998), although such gaps can also increase the potential for invasive species (Burns 2004). The western burrowing owl may also benefit from improved habitat and

foraging conditions (Orth and Kennedy 2001; USFWS 1998); however, livestock have the potential to crush burrows (Zambrano 1998), although such effects would be infrequent given the use of enclosures and limited number of livestock in any given year (USFWS 1998). Enclosures would also be used to prevent grazing and destruction of shrub habitat important to prey species utilized by San Joaquin kit fox (USFWS 1998). Use of portable water troughs to support prescribed grazing would have no net effect on mosquito breeding nor the spread of West Nile virus (Walker and Naugle 2012) as the Service plans to simultaneously remove a portion of the existing water control system that was installed previously for livestock grazing, but is no longer used. As a result, no net increase in standing water or threat from West Nile virus on Bitter Creek NWR is anticipated, relative to Alternative A. Furthermore, as there is a regional threat from West Nile, the Service vaccinates all condors through a recapture program to ensure that they remain healthy, thereby protecting condors from transmission via existing stock tanks and the proposed addition of portable, temporary water troughs to support prescribed grazing. Removal of portions of the existing water control structures also mitigates for potential increases in competition between coyotes and the San Joaquin kit fox, which can occur with changes in water availability (Cypher and Spencer 1998). For mitigating impacts to tricolored blackbirds from prescribed grazing, exclusion fences will be installed around wetlands to prevent livestock from impacting tricolored blackbird habitat. This management practice will also minimize the creation of water-filled hoof prints that may provide breeding habitat for mosquitoes that could spread West Nile virus. Although there may be short-term adverse and beneficial effects of vegetation control measures to targeted special status wildlife species as noted above, in the long term, improving grassland habitat quality would likely provide net benefits to those species favoring open grasslands. Such an outcome; however, is hypothesized and would need to be tested through monitoring and the adaptive management process at this refuge, as further described in Appendix H.

Prescribed grazing has the potential to cause both beneficial and minor adverse impacts to targeted special status species, as well as potential for minor adverse effects to non-targeted special status plant species. Potential adverse effects of livestock grazing on biological and natural resources that may be utilized by special status species include: proliferation of non-native and invasive species; trampling of vegetation; trench creation; wallowing during resting; habitat fragmentation; creating gaps for invasive species; overgrazing; habitat fragmentation; soil disturbance (collapsing burrows, compaction, disruption of soil crusts, and exposure to erosion); reduction in soil mycorrhizae; preferential grazing of perennials over annuals; potential adverse effects on ungulate populations; and riparian damage (as cited in Belnap et al. 2001; Belsky and Gelbard 2000; Gogan and Barrett 1987; Jones 2001; CalPIF 2000; Ellison 1960; Holland and Keil 1995; Kie et al., 1991; Krueper 1993; Lacey 1987; Loft et al. 1991; Schiffman 1997; Stewart et al. 2002; Taylor and Davilla 1986; USFWS 1998; Van Dyne and Heady 1965, Zambrano 1998). Adverse effects to special status plants and other wildlife species would be partially mitigated through implementing monitoring and adaptive management measures and mitigation measures as part of the grazing management plan outlined in Appendix H. The following monitoring will be conducted: surveying for the location of all special status plants that are either known to occur, or may occur, at Bitter Creek NWR (to include an ecological assessment within each unit to determine whether certain special status species may occur); response monitoring for both target and non-target special status wildlife species; and RDM and habitat monitoring to reduce the potential for overgrazing effects. Mitigation measures include avoidance of locations with known special status species through erecting temporary exclusionary fences to prevent disturbance of known locations and protection of sensitive habitat (e.g., wetlands and riparian areas); adherence to restrictions and permit conditions outlined in SUPs (e.g., livestock quarantines and location restrictions to reduce the risk of introducing invasive species from livestock and vehicles used to transport livestock [Bush 2006]); and modifying permit conditions through adaptive management to ensure protection of all plant and wildlife special status species at Bitter Creek NWR (see Appendices C and H of the CCP for list of grazing restrictions). Response of native ungulate populations to livestock grazing will be monitored and mitigated through adaptive management (to include cessation of grazing if necessary) in order to ensure that the availability of foraging opportunities (ungulate carcasses) to support California condor populations do not decline as a result of prescribed grazing activities.

There is one Federally-listed plant species on Bitter Creek NWR, as well as two others that may occur given habitat conditions at the refuge. It is unclear to the extent that livestock grazing impacts these species and native ground-nesting bees and other insect pollinators, as the literature cites both positive and negative effects (Chaplin-Kramer et al. 2011, Mazer et al. 1993, USFWS 1998). Professional opinion suggests that impacts could occur if not mitigated. For the endangered Kern mallow, potential impacts from trampling during prescribed grazing will be mitigated thorough inventorying of the species, installing exclusion fencing as needed, and avoidance. Units with existing Kern mallow populations (USFWS 1998) will be closed to prescribed grazing to avoid adverse effects. Similar monitoring and mitigation strategies will be used to avoid any impacts to the California jewelflower and the Joaquin woollythreads, as they have the potential to be present on Bitter Creek NWR.

Although not documented on Bitter Creek NWR, the Kern primrose sphinx moth (*Eurproserpinus euterpe*) is a federally listed threatened species, which has the potential to occur at Bitter Creek NWR. Grazing has the potential to consume host plants used by the Kern primrose sphinx moth, damage habitat (trample host plants, soil compaction, invasive species impacts), and consume moth larvae (Jump et al. 2006, USFWS 2007). To protect the Kern primrose sphinx moth, the Service will conduct surveys to determine if the species and host plant occurs on Bitter Creek NWR. If either is present, then the grazing management plan would be modified to conserve Kern primrose sphinx moth habitat, including installation of exclusion fencing, avoidance, further monitoring, and adaptive management.

The Prescribed Grazing Plan would utilize adaptive management (considering the potential effects of climate change), research, monitoring, and grassland restoration techniques to ensure that all management regimes achieve intended goals and objectives for grassland habitat, while at the same time protecting special status plants. This effort would be enhanced through additional research, inventorying, and monitoring. For locations where special status plants or other non-targeted wildlife are present, the Service would alter management prescriptions for the unit to avoid adverse impacts to these species. As such, the Service has implemented an extensive special status species monitoring program (see Appendix H, Table 7) for each species that may occur within a particular unit to mitigate potential adverse effects to such species.

Given the uncertainties associated with the effectiveness of such a plan at this refuge, the Service would conduct a monitoring program of both habitat and wildlife species to evaluate the change in habitat types and the effect on wildlife for both targeted special status species and non-target wildlife (see Appendix H, Table 7 for specific monitoring plans). In the event that the program is not achieving stated objectives for benefitting target wildlife species, then adjustments would be made in grazing permits to improve their effectiveness to enhance habitat and wildlife objectives, as well as mitigate any minor adverse effects (to include cessation of livestock grazing). Adjustments may involve changes in timing, stocking density, livestock type, access, maintenance, reporting, supplemental feeding methods, support equipment usage, livestock quarantine and origin restrictions (to reduce invasive species risk from livestock and vehicles used to transport livestock), and monitoring (Bush 2006, Herrick et al. 2012).

Chemical control measures used in part to restore important habitat would have net long-term positive benefits to special status species. Any potential short-term adverse effect from herbicide usage would be mitigated through implementing BMPs and avoiding application of herbicides in areas currently utilized by special status species, along with sufficient buffers to limit exposure from incidental spraying and spray drift. Although Pathfinder II may be a concern to birds, small mammals, and ungulates when applied as a broad foliar spray or through aerial spraying (USFS 2011b), the Service would only apply Pathfinder II at Bitter Creek NWR on tamarisk tree stumps and in the girded cuts in the tamarisk tree trunks using backpack applicators. This approach will limit the potential for incidental spraying of non-target foliage, non-target insects, and spray drift effects. Broad foliar spray application and aerial spraying would not be conducted at Bitter Creek NWR. To further reduce the potential for incidental exposure, spraying is done in the winter to limit contamination of foliage and insects that may be consumed by wildlife.

Protecting and enhancing oak and other woodlands on the refuge may improve habitat conditions for many birds of Conservation Concern and California Partners in Flight focal species, including grasshopper sparrow, northern harrier, olive-sided flycatcher, tricolored blackbird, Vaux's swift, vesper sparrow, loggerhead shrike, Bewick's wren, black-headed grosbeak, Bullock's oriole, California thrasher, greater roadrunner, Lawrence's goldfinch, Nuttall's woodpecker, oak titmouse, and spotted towhee (CalPIF 2002a). I&M measures and adaptive management would be employed as BMP to avoid or minimize any potential short-term minor adverse effects to special status species during restoration and management projects.

Overall, the net effect from all management activities under Alternatives B would result in minor to moderate positive impacts to targeted special status wildlife species (if present now or in the future) relative to Alternative A, with the potential for minor adverse effects to non-targeted special status species, which would be partially mitigated through monitoring and adaptive management.

4.2.7.4 Alternative C

Implementing Alternative C would result in moderate positive impacts to the California condor, and minor to moderate positive effects to other targeted special status wildlife species (if present now or in the future), with the potential for minor adverse effects to non-targeted special status species, which would be partially mitigated through monitoring and adaptive management. Under Alternative C, similar effects to special status species previously described for Alternative B would be achieved through implementation of condor management and habitat management measures discussed previously. An expanded volunteer program and support facilities would provide some added benefits to condor management under Alternative C. Potential increases in visitation from establishing an additional trail off the refuge entrance at Cerro Noroeste Road would be mitigated through adaptive management to avoid disturbing condors. Added protection to condor roost sites would be achieved under Alternative C by creating fire breaks around these locations. On the other hand, Alternative C would not include climate change and adaptation planning and all water diversions and stock tanks would be eliminated except as needed for fire suppression and bunkhouse use. This alternative also includes more intense short grass and mosaic habitat restoration and increased tamarisk removal in riparian areas as compared to Alternative B, thereby generating additional positive benefits to special status species that utilize these areas. Overall, the net effect from all management activities under Alternatives C would result in moderate positive impacts to the California condor, and minor to moderate positive effects to other targeted special status wildlife species relative to Alternative A, with the potential for minor adverse effects to non-targeted special status species, which would be partially mitigated through monitoring and adaptive management. In general, Alternative C would provide more benefits to special status species in grassland, riparian, and wetland habitat, as compared to Alternative B due to additional habitat restoration efforts, while the effects to condors would be similar to Alternative B.

Effects on the Bitter Creek NWR Socioeconomic Environment

4.2.8 Socioeconomics – Bitter Creek NWR

4.2.8.1 Alternative A – No Action

Alternative A would result in minor positive impacts to the local economy. Current refuge management practices would continue but would not necessarily result in changes in staff or local expenditure levels. Current management activities (e.g., volunteer activity, periodic tours, refuge management activity) would be expected to have a negligible effect on the local area demographics and economy. The refuge would remain closed to the general public, so there would be no changes in recreational activities and visitation to the refuge.

4.2.8.2 Alternative B – Preferred Alternative

Alternative B would result in minor positive impacts to the local economy. Under this alternative, the refuge would experience some increased employment and spending in the local area for materials, construction, and services related implementation of management measures outlined for Alternative B.

Using the EIFS model, the increased employment (estimated to be 36 direct and induced jobs total) and increased expenditures would have a minor positive impact on demographics and the economy of the local area. The increase in total direct and induced sales volume related to the implementation Alternative B totaled approximately \$7,000,000 per year (reasonable upper-bound expenditures in any given year during the next 15 years), with a net increase in direct and induced income of \$1,500,000 per year. The total sales volume is estimated to increase by 0.01%, while the total increase in income accounts for less than a 0.005% increase in historic economic activity for the region (i.e., Kern, Santa Barbara, and Ventura counties). This economic effect is well within the norms of historic variation in economic activity for this region. These figures, however, do not include economic activity generated by the general public engaging in non-consumptive recreational activity during occasional tours and volunteer efforts at the refuge (e.g., lodging, refreshments, restaurants, fuel, and supplies). Under Alternative B, partial opening of the refuge to visitors, additional outreach events, increased tours, and enhanced volunteer activities would increase non-consumptive recreation activities on the refuge, resulting in minor positive economic impacts for the local economy.

Under this alternative, prescribed grazing is being considered for the grassland areas (up to 9,000 acres in total). To estimate the economic value of allowing grazing, the AUM to acreage ratio used by the Refuge Complex when grazing was permitted in the past (prior to 2005) was assumed in order to estimate a reasonable upper-bound grazing intensity for the refuge of approximately 360 AUM over a 7-month period (November to May). Collectively, ranchers would save approximately \$37,800 annually, if grazing was permitted at this level on the refuge, as compared to grazing on privately held lands.² The \$37,800 annual savings would be meaningful to individual ranchers who hold grazing agreements, thereby decreasing operating costs and making their products more competitive relative to ranchers using private grazing lands. However, this cost benefit would be negligible in consideration of the size of the regional economy and the availability of other grazing lands.

4.2.8.3 Alternative C

Under Alternative C, the socioeconomic effects would be the same as Alternative B but slightly more beneficial (though still considered minor). This alternative has the same employment and economic impacts as Alternative B, but additional visitor services may slightly increase positive economic impacts from expanded volunteer, access, and outreach programs. Grazing effects would also be the same as those estimated for Alternative B.

4.2.9 Public Use – Bitter Creek NWR

4.2.9.1 Alternative A – No Action

Alternative A would result in no change in public use of the refuge. The refuge would remain closed with periodic patrols and limited guided tours, supporting some opportunities for wildlife-dependent public uses. In the past, there were approximately 200 visitors per year to the refuge from guided tours involving no more than 40 individuals per trip, thereby providing some minor beneficial recreational use of the refuge.

4.2.9.2 Alternative B – Preferred Alternative

Alternative B would result in moderate positive benefits to residents through increased recreational opportunities and access. The refuge would have increased visitation and non-consumptive recreational opportunities by opening up the refuge to the general public. This visitor services program would include: development of a Visitor Services Plan; establishing a 1-mile hiking loop trail off of Klipstein Canyon Road; constructing an additional condor observation location and pull-out off Cerro Noroeste Road; conducting additional refuge tours; expanding volunteer projects (approximately 5 volunteer events/year); expanded educational and outreach activities (goal of educating 500 residents in 5 years about the refuge

² This estimated amount is determined assuming that the average California rate for grazing is \$16.40 per AUM (USDA 2011) and the federal grazing fee is \$1.35 per AUM (DOI 2011).

and condor effects from lead and microtrash); updating outreach materials; establishing a roadside wildlife observation area; enhanced maintenance of roads and trails; and establishing a refuge office, visitor contact station, and parking. Such actions would increase non-consumptive wildlife-dependent recreational activities (wildlife observation, photography, hiking, and environmental education). Although recreational activities would increase, it is difficult to estimate how many additional visitors would come to the refuge, given its remote location. In any event, enhanced habitat and wildlife management efforts implemented as part of Alternative B may increase the wildlife-dependent recreational experience of visitors and volunteers engaged in photography or observation. Overall, there would be moderate positive benefits to residents through increased recreational opportunities and access from implementing Alternative B relative to Alternative A.

4.2.9.3 Alternative C

Alternative C would result in moderate positive benefits to residents through increased recreational opportunities and access, similar in nature to those described for Alternative B. In addition to the measures outlined for Alternative B, the refuge would add an additional hiking trail near the condor pull-out along Cerro Noroeste Road, expand outreach on and off the refuge, add a volunteer coordinator position, enhance tours of the refuge and volunteer projects, update outreach materials, and establish a roadside wildlife observation area. Public access would be carefully monitored to ensure that there is no disturbance of condor nesting areas and habitat, in accordance with BMPs specified in Appendix 1 of the EA. In general, Alternative C would provide more opportunities for public access and visitation, as compared to Alternatives A and B.

4.2.10 Cultural Resources – Bitter Creek NWR

4.2.10.1 Alternative A – No Action

Alternative A may result in minor adverse effects to cultural resources. Current management actions that may disturb and expose soils have the potential to physically disturb an unknown site, alter its setting, or introduce elements out of character with the site, which would result in an adverse effect. The Service would continue to manage and conserve cultural resources at Bitter Creek NWR and exercise section 106 of the NHPA, including consultation with the SHPO and pertinent tribes, in order to eliminate or minimize adverse effects. Prior to ground disturbing activities, surveys and other requirements would be followed to minimize the potential for adverse effects to cultural resource sites that have yet to be discovered in accordance with applicable regulations and guidance. Initial assessment of historic structures on the refuge is in progress. Under Alternative A, the refuge would remain closed to public use, which would further reduce potential for adverse effects.

To date, 13 archaeological surveys, covering approximately 7.5% (1,886 acres) of Bitter Creek NWR, have been conducted on the refuge. There are 7 recorded prehistoric sites and 3 recorded historic sites, 1 with 9 separate structures of features within the refuge boundaries. None of the prehistoric sites have been evaluated for their eligibility for listing on the NRHP. Two of the historic features were determined ineligible for listing, and 1 historic site is located within refuge boundaries but is not under the jurisdiction of the Service. It is possible that additional archaeological sites would be exposed by human actions or natural causes in the future.

Potentially adverse effects to cultural resources would be minimized through cultural resource reviews, surveys, and compliance with section 106 of the NHPA. All sites discovered in the future would be treated as eligible for listing on the NRHP until listed or formally evaluated as ineligible in consultation with the SHPO. Under federal ownership, archaeological and historical resources within a refuge receive protection under federal laws mandating the management of cultural resources, including, but not limited to, ARPA, AHPA, NAGPRA, and NHPA. Under all alternatives, if any cultural resources are discovered on the refuge, the Service would take all necessary steps to comply with section 106 of the NHPA, in consultation with the SHPO and pertinent tribes. None of the archaeological sites on Bitter Creek NWR are documented as containing human remains. However, sites identified in the future could be found to contain human remains, funerary items, sacred objects, or items of cultural patrimony and may therefore

require consideration under the Native American Graves Protection and Repatriation Act of 1990 (NAGPRA). The Service will comply with the NAGPRA consultation process and other applicable laws and guidance required for consideration of human remains.

4.2.10.2 Alternative B

Alternative B may result in minor adverse and positive effects to cultural resources. Under this alternative, the Service would continue to manage and conserve cultural resources at Bitter Creek NWR, as well as prepare a Cultural Resources Management Plan and implementation program to proactively manage and protect these resources, resulting in some positive effects. This program would identify archaeological sites that coincide with existing and planned roads, facilities, public use areas, and habitat projects; develop a GIS layer for cultural resources; evaluate threatened and impacted sites and structures for eligibility to the NRHP; and prepare and implement activities to avoid and mitigate impacts to sites and structures as necessary.

Alternative B also includes additional habitat management, fire suppression measures, construction projects, and other activities that would have the potential to disturb unknown cultural resource sites. For example, the Service would develop a Visitor Services Plan and open a 1-mile loop trail at Klipstein Canyon, and vehicle turn-out, which would increase human activity and disturb soils in these areas. This alternative also proposes removing/restoring former structures of the former Cliff Hudson ranch site and installing a refuge administrative office and visitor contract station. Construction of a new building or demolition of existing old structures would be a federal undertaking that requires compliance with section 106 of the NHPA. Potential adverse effects to cultural resources would be fully determined when specific and detailed project plans are available. The Service would follow the same process to comply with section 106 of the NHPA and NAGPRA as described in section 4.2.10.1 when ground disturbing activities are proposed.

4.2.10.3 Alternative C

Alternative C may result in minor adverse and positive effects to cultural resources similar to those outlined for Alternative B. Under this alternative, the Service would continue to manage and conserve cultural resources at Bitter Creek NWR, as well as implement a cultural resources management program similar to the measures outlined for Alternative B. This program would identify archaeological sites that coincide with existing and planned roads, facilities, public use areas, and habitat projects; develop a GIS layer for cultural resources; evaluate threatened and impacted sites and structures for eligibility to the NRHP; and prepare and implement activities to avoid and mitigate impacts to sites and structures as necessary. Additional measures implemented only under Alternative C includes: implementing a proactive historic preservation program; developing formal partnerships with Native tribes for cultural resources inventory, evaluation, and project monitoring; and implementing other recommendations included in the Service's Cultural Resources Review for Bitter Creek NWR.

As with Alternative B, Alternative C includes similar habitat management, fire suppression measures, construction projects, and other activities that would have the potential to disturb unknown cultural resource sites as outlined for Alternative B. In addition, Alternative C includes establishing of an additional condor interpretative trail and associated parking. All the construction and demolition activities proposed for Alternative C would be a federal undertaking that requires compliance with section 106 of the NHPA. Potential adverse effects to cultural resources would be fully determined when specific and detailed project plans are available. The Service would follow the same process to comply with section 106 of the NHPA and NAGPRA as described in section 4.2.10.1 when ground disturbing activities are proposed.

4.2.11 Environmental Justice (Common to all Alternatives) – Bitter Creek NWR

On February 11, 1994, the President issued Executive Order 12898 *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, requiring that all federal agencies achieve environmental justice by “identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on

minority population and low-income population.” Environmental justice is defined as the “fair treatment for peoples of all races, cultures, and incomes, regarding the development of environmental laws, regulations, and policies.”

The mission of the Service is working with others to conserve, protect, and enhance fish and wildlife and their habitats for the continuing benefit of the American people. The developing environmental justice strategy of the Service extends this mission by seeking to ensure that all segments of the human population have equal access to America’s fish and wildlife resources, as well as equal access to information that would enable them to participate meaningfully in activities and policy shaping.

Bitter Creek NWR is located in a remote area with low population density. With respect to poverty levels, the areas around the refuge have poverty levels that are commensurate with the state average (22.2% in Kern County, 15.0% in Santa Barbara County, and 10.5% in Ventura County versus 14.2% in the state of California). In addition, minority populations within the region are commensurate with the levels found in the state (U.S. Census Bureau 2011). In any event, due to the nature of the action and the analysis previously discussed, the Service has concluded that the proposed action does not result in disproportionately high and adverse human health or environmental effects to any of the communities around the refuge. Furthermore the Service has concluded that no minority and low-income populations or communities would be disproportionately affected by any of the alternatives. Therefore, there are no environmental justice concerns associated with implementing any of the alternatives.

4.2.12 Cumulative Effects – Bitter Creek NWR

In this section, the cumulative effects of the proposed alternatives are analyzed. Cumulative impacts are considered to be those that result from the incremental effects of the Service’s proposed action when added to past, present, and reasonably foreseeable future actions, regardless of the agencies or parties involved. Cumulative impacts can result from individually minor but collectively significant actions occurring over time. For an EA, the cumulative impact analysis is done only to a sufficient level to allow the decision maker to make a determination of significance for the proposed action, as stated in the Service Manual (550 FW 1). Thus, this analysis focuses on whether implementation of the CCP’s preferred alternative (Alternative B), or combinations of management measures being considered for other alternatives (i.e., Alternatives A or C), would result in a significant cumulative adverse impact. A summary of these findings are provided here for each aspect of the environment, including the physical, biological, and social environment, as appropriate. Cumulative impacts are considered for a 15-year period for the refuge and throughout the study area (i.e., the refuge and surrounding areas in Kern, Ventura, and San Luis Obispo counties), which is the projected time frame for implementing the CCP. The Rose Spring Area of Critical Environmental Concern (ACEC) is a designation by BLM and is located in the Owens Valley in the Eastern Sierra Nevada Range, which is beyond the region of influence of the refuges addressed in the CCP. The Haiwee Geothermal Leasing Area (HGLA), located in Inyo County, is another energy project on BLM lands located outside of the region of influence for this EA. Therefore, Rose Spring ACEC and HGLA were not considered further in this cumulative effects analysis.

An important component of this analysis is evaluating other past, present, and reasonably foreseeable actions occurring within the study area that may contribute to cumulative effects, as outlined here.

- Regional growth and development over the past decades has increased and this trend is projected to continue into the future. This growth has resulted in reduced and fragmented habitat throughout the region beyond the boundaries of the refuge, increased traffic generation, soil disturbance, and air emissions in the region (e.g., population growth in Kern County has risen by 26.9% from 2000 to 2010 and will continue to increase [U.S. Census Bureau 2011]);
- Energy projects and other infrastructure projects in the region have increased in the past decades (in the past oil and gas exploration, and more recently renewable energy projects) and additional projects may occur, resulting in reduced and fragmented habitat beyond the boundaries of the refuge, along with increased physical obstructions for birds (e.g., 13 approved solar projects in Kern County, 34

projects deemed complete for processing, and an additional 21 project applications submitted to include several large solar projects [Beacon Solar Energy Project and Solar Millennium Ridgecrest] [Kern County 2012]; nearly 20 wind projects have been approved or have been built in Kern County, while additional wind projects are under review [e.g., Alta Infill II Wind Energy Project, Clearvista Wind Project, and others] [Kern County 2012]); transmission lines maintained by Pacific Gas & Electric and Southern California Edison [CEC 2011]; oil and gas operations; roads; and telecommunication towers);

- Changes in agricultural practices and reduced grazing opportunities have reduced potential forage for California condors and reduced grazing opportunities for ranchers due in part to the creation of the refuge and continued growth in development throughout the region;
- Wildfire risks and intensity has the potential to increase in the coming decades due to climate change and expanded development; and
- Hydrology has been adversely impacted by past grazing and water control measures, and may be adversely impacted in the coming decades by global and regional climatic events (e.g., increased frequency in extreme weather events [storm events causing increased erosion and increased incidence and severity of droughts]).

Physical Environment. Minor cumulative adverse impacts on air quality and noise would occur from implementing the proposed action, when added to air and noise impacts associated with increased development in the region, population growth, fugitive ROG emissions from oil and gas operations, and expansion of energy and transportation infrastructure. Increases in fuel efficiency, energy conservation, and renewable energy usage may partially mitigate for future cumulative air quality effects. No additional cumulative effects are expected to geologic resources, soils, and water quality to the regional study area from implementing the proposed action given the size of the refuge and the limited activities that occur within the refuge. Localized positive benefits to hydrology from implementing the proposed action would not likely offset cumulative adverse effects at the regional scale associated with development, expansion of infrastructure, and climatic events.

Biological Environment. Although implementing Alternatives A, B, or C would provide positive benefits to vegetation, wildlife, and special status species, it is unlikely that such actions would offset adverse cumulative effects occurring from other stressors at a regional scale, with the possible exception of the California condor. Expansion of energy and telecommunication infrastructure (e.g., wind turbines, oil and gas development, transmission lines, and communication towers), urban expansion, grazing, [arguably] increasing fire frequency, and expansion of transportation infrastructure in the region have resulted in cumulative adverse effects to vegetation (e.g., 90% loss of riparian forest communities, loss of woodland habitat, and loss of native grasslands), wildlife, and special status species outlined previously (CalPIF 2000; CNPS 2010; Davis et al. 1995; Knopf et al. 1988; USFWS 2010). With respect to condor population growth and survivorship, regional loss of cattle ranches due to continued development may continue to reduce forage opportunities for condors. Ingestion of lead pellets in forage and microtrash has also resulted in condor mortalities, but monitoring and treatment efforts, public outreach, and restrictions on use of lead would reduce effects to condors in the future. Given the intensity of active management for the condor by the Service and others, it is likely that implementing Alternatives B or C may result in net beneficial cumulative effects for the condor, with population levels and survivorship increasing during the next 15 years.

Socioeconomic Environment. Cumulative minor beneficial effects may occur to socioeconomics, as development growth, combined with increases in refuge expenditures and activities as proposed in the CCP, would induce additional economics growth for the region (approximately \$7 M per year in increased employment and spending from direct and induced economic activity). Furthermore, re-establishing limited grazing activity would also provide some economic benefits to individual ranchers (as detailed in section 4.2.8), although such effects would be negligible for the overall regional economy.

Implementing the proposed action would elevate public awareness and increase regional recreational opportunities, thereby resulting in positive cumulative effects. No cumulative effects are expected for cultural resources and environmental justice concerns.

4.3 Blue Ridge National Wildlife Refuge

Table 4-3 presents a summary of the effects to resources at Blue Ridge NWR from implementing the 3 alternatives. Resource specific effects are described in sections 4.3.1 through 4.3.14.

Table 4-3. Summary of Environmental Effects for each Alternative: Blue Ridge NWR

Resource	Alternative A: No Action Alternative (Maintain Current Management)	Alternative B: Preferred (Relative to Alternative A: No Action)	Alternative C (Relative to Alternative A: No Action)
Physical Environment –Blue Ridge NWR			
Geology and Soils	Minor negative impact, fire management practices can temporarily expose soils to erosion.	Minor negative impact from minor vegetation clearing for habitat management and maintaining hiking trails/roads, which would temporarily expose soils to erosion.	Same as Alternative B. Overall, impacts are less negative than Alternative B, due to the refuge remaining closed.
Air Quality	Minor negative impact due to particulate emissions from pile burning, which would continue to reduce wildfire risk and maintain roads and fire breaks.	Minor negative impact from increases in particulate emissions from prescribed burning and increases in vehicle emissions from additional visitation, while minor positive impacts would occur from reducing carbon footprint.	Minor negative impact from increases in particulate emissions from pile burning from limited vegetation clearing and slight increase in vehicle emissions from increases in visitation from guided tours. Overall, impacts are less negative than Alternative B.
Noise	Negligible impact	Similar to Alternative A	Similar to Alternative A
Water	Negligible short-term negative impact to water quality from increased erosion, while no effect on hydrology.	Minor short-term negative effect on water quality from increased erosion, while no effect on hydrology.	Similar to Alternative B. Overall, impacts are less negative than Alternative B due to the refuge remaining closed.
Biological Environment –Blue Ridge NWR			
Vegetation	No short-term impact, as vegetation cover and communities would be maintained. Long-term minor positive impact from thinning and pile burning to reduce the risk of more severe fires in the long term.	Minor positive and negative impacts from habitat management, enhanced invasive species control and monitoring, and habitat monitoring and research. Some species and areas may experience minor negative impacts from habitat manipulation (restoring old growth conditions) and limited clearing.	Minor positive and negative impacts from invasive species control, weed management, monitoring, and research. Very minor negative impact from limited vegetation burning/clearing. Overall, impacts are similar to Alternative B.

Resource	Alternative A: No Action Alternative (Maintain Current Management)	Alternative B: Preferred (Relative to Alternative A: No Action)	Alternative C (Relative to Alternative A: No Action)
Wildlife Resources	No impact to wildlife diversity and populations given the limited management at the refuge.	Minor positive impact to targeted wildlife species from enhanced invasive species control, monitoring, research, and habitat manipulation (old growth), while some species may experience minor negative impacts from habitat manipulation and condor management, particularly non-targeted wildlife that prefer current conditions.	Minor positive impact to targeted wildlife species from invasive species control, monitoring, and research; while some species may experience minor negative impacts from habitat manipulation and condor management, particularly non-targeted wildlife that prefer current conditions. Overall, impacts are slightly more positive than Alternative B, since the refuge would remain closed.
Special Status Species	No impact given the limited management at the refuge.	Minor long-term positive impact on California condor survivorship and habitat from condor management activities. Public access would be controlled to prevent adverse impacts to condors, with additional enforcement. Potential for minor positive and negative impacts from enhanced monitoring, research, and management to benefit special status species, survivorship, and habitat quality.	Minor long-term positive impact on California condor survivorship and habitat from condor management activities. The refuge would remain closed, with additional enforcement. Overall, impacts are slightly more positive than Alternative B, given the enhanced roost management. Potential for minor positive and negative impacts from enhanced monitoring, research, and management to benefit special status species, survivorship, and habitat quality.
Socioeconomic Environment –Blue Ridge NWR			
Socioeconomics	Negligible impact, the refuge would remain closed with periodic patrols. Staff and expenditure levels would remain at low levels.	Minor positive impact to the local economy from increased non-consumptive recreational use of the refuge and visitors, increased expenditures, and staffing changes.	Minor positive impact from increased guided tours and volunteer participation, and staffing changes. Overall, impacts are less positive than Alternative B.
Public Use	No change; the refuge would remain closed to public use with periodic law enforcement patrols.	Moderate positive impact from opening the refuge to public use, with increased non-consumptive recreational opportunities.	Minor positive impact, the refuge would remain closed with additional patrols and additional guided trips. Overall, impacts are less positive than Alternative B.
Cultural Resources	No impact, the refuge would remain closed to public use with very low management activities at the refuge. Any future impacts minimized through cultural resources reviews and surveys, as required.	Minor negative impact from soil disturbing activities and increased public access resulting in potential for disturbance of unknown cultural resources. Impacts minimized through cultural resources reviews and surveys, as required.	Similar to Alternative B, but less negative given that the refuge would remain closed to public use. Impacts minimized through cultural resources reviews and surveys, as required.
Environmental Justice	No impact.	Same as Alternative A, no impact.	Same as Alternative A, no impact.

Effects on the Blue Ridge NWR Physical Environment

4.3.1 Geology and Soils – Blue Ridge NWR

4.3.1.1 Alternative A – No Action

Continuation of current refuge management practices would have a negligible adverse effect on soils and no adverse effects on geologic resources, given the limited management that occurs at Blue Ridge NWR currently. There would be no change to soils and geology from continuation of current measures. Pile burning would continue along the WUI and roads according to the current Fire Management Plan, as well as limited mechanical vegetation removal for maintaining fire breaks and road access, as necessary. Such actions would result in temporary and localized removal of vegetation exposing erodible soils to water and wind erosion. In addition, limited human access, vehicle access, and equipment usage may result in localized compaction of soils. Vehicle access and heavy equipment usage (including vehicle and equipment access) may also increase the potential for small releases of oils, grease, and other petroleum products to soils. Soil erosion control measures, avoidance of riparian and wetland habitat, adherence to Service regulations and policy, and BMPs discussed in Appendix 1 of the EA would reduce potential adverse effects to soils. Given the localized and/or temporary nature of these effects and BMPs specified in Appendix 1 of the EA, only minor adverse effects would occur to soil resources.

Additionally, potential effects to the biological and physical environment associated with the proposed site-, time-, and target-specific use of pesticides PUPs on the refuge would be evaluated using scientific information and analyses in this chapter. PUPs (including appropriate BMPs) would be approved where scientific evidence indicates that effects to refuge biological resources and its physical environment are likely to be minor, temporary, or localized in nature. Along with the selective use of pesticides, PUPs would also describe other appropriate IPM strategies (biological, physical, mechanical, and cultural methods) to eradicate, control, or contain pest species to achieve resource management objectives.

The effects of non-pesticide IPM strategies to address pest species on the refuge would be similar to those effects described elsewhere within this chapter, where they are discussed specifically as habitat management techniques to achieve resource management objectives on the refuge. For example, the effects of mowing to control invasive plants in an improved pasture would be similar to those effects summarized for mowing, where it would be specifically used to provide short grass foraging habitat for wildlife.

Based on scientific information and analyses in this chapter, pesticides allowed for use on the refuge would be of relatively low risk to non-target organisms as a result of low toxicity or short persistence in the environment. Thus, potential impacts to refuge resources and neighboring natural resources from pesticide applications would be expected to be minor, temporary, or localized in nature.

4.3.1.2 Alternative B – Preferred Alternative

Implementing Alternative B would have a minor adverse effect on soils and no adverse effects on geologic resources. Under Alternative B, pile burning activities along the WUI and roads would continue as described under Alternative A. In addition, more intensive habitat management and invasive species control measures would be implemented relative to Alternative A (e.g., pile burning and thinning activities), as well as vegetation clearing around condor roosting trees for fire protection. These activities would increase the potential for short-term, localized exposure of bare soils, resulting in increased water and wind erosion relative to Alternative A. Implementation of BMPs (see Appendix 1 of the EA) would minimize loss of soils during soil disturbing activities. Additional monitoring, coordination, and mapping would provide some long-term benefits to soils and reduce adverse effects. Overall, the net effect on soils from all management activities under Alternatives B would result in minor, short-term adverse impacts to soils relative to Alternative A.

4.3.1.3 Alternative C

Under Alternative C, similar minor adverse effects to soils previously described for Alternative B would

occur from implementing condor and habitat management measures. Potential soil erosion associated with construction of a small wind/rain gauge weather station (25 square feet) would be minimized by implementation of BMPs discussed in Appendix 1 of the EA. Blue Ridge NWR would remain closed to public use under Alternative C; therefore, there would be less trail and road maintenance activities and soil erosion relative to Alternative B. Overall, the net effect on soils from all management activities under Alternatives C would result in short-term, localized, minor adverse impacts to soils relative to Alternative A. In general, Alternative C would result in slightly less adverse effects to soils as compared to Alternative B due to the refuge remaining closed.

4.3.2 Air Quality – Blue Ridge NWR

Blue Ridge NWR is located in the San Joaquin Valley Air Basin and is regulated by the San Joaquin Valley Unified Air Pollution Control District. This basin is classified as being in severe nonattainment status for ground-level ozone and nonattainment for PM₁₀. All alternatives would include pile burning along WUI and roads according to the current Fire Management Plan, as well as limited pile burning of vegetation for maintaining fire breaks and fuels reduction. Pile burning is used primarily in winter, when air quality is less likely to be adversely affected. Pile burning activities may increase PM₁₀ and carbon emissions, but such effects would be minor because: 1) the Service would continue to conduct such activities in accordance with an approved Fire Management Plan and obtain burning permits from the San Joaquin Valley Unified Air Pollution Control District; 2) permit conditions would be followed by the Service; 3) effects would be avoided and minimized by coordinating activities with the district, implementing burn prescriptions and cessation requirements based on predetermined levels established by the district, and use of fire breaks to prevent wildfires; and 4) effects mitigated through small unit sizes, wind direction considerations, and distance to receptors. Other refuge activities that generate PM₁₀, ozone precursors (ROG and NO_x), and carbon include vehicle and heavy equipment use associated limited management activities, and forest thinning. Activities that disturb and expose the soil, such as mowing, disking, grading (road maintenance), vegetation clearing, and other activities, can also generate increased particulate emissions, particularly during windy conditions. Increased air emissions associated with these activities would generate minor, localized adverse impacts to air quality. Emissions associated with vehicle trips and equipment usage would be minor given the low level of activity at the refuge relative to current emissions within the San Joaquin Valley Air Basin associated with regional traffic and equipment usage. Thus, air emissions for activities common to all alternatives are considered minor.

4.3.2.1 Alternative A – No Action

Minor adverse impacts to air quality would remain the same under Alternative A. Pile burning at WUI and roads, and other limited pile burning would continue to reduce fuel loads and clear vegetation for fire breaks. Limited soil disturbing activities would also continue at their current levels in order to maintain road access, fire protection, and fire suppression measures. In addition, vehicle emissions (PM₁₀, ROG, carbon, and NO_x) would continue at current levels for limited refuge management activities.

4.3.2.2 Alternative B – Preferred Alternative

Implementing Alternative B would result in minor adverse effects to air quality. For Alternative B, management activities that would generate additional emissions include: maintenance of condor roosting sites; pile burning and understory prescribed burning for habitat management to develop old-growth forest characteristics; enhanced visitation from opening up the refuge including maintenance of existing fire breaks, roads, and trails for hiking; and additional volunteer activities. Prescribed burning for habitat management and vegetation clearing activities (maintenance of roosting sites, access maintenance) would generate additional burning activities relative to Alternative A. In any event, such activities would be conducted in accordance with restrictions and prescriptions specified in burning permits, as well as in close coordination with the San Joaquin Valley Unified Air Pollution Control District in order to reduce regional effects (see Appendix 1 of the EA). It should be noted that such activities would reduce the potential for more severe wildfires, which would result in far greater particulate emissions. In addition, clearing activities would result in temporary increases in exposed soil, which would increase fugitive dust emissions, particularly during strong winds. Also, increased habitat management, visitor access, and

volunteer activities would result in increased use of vehicles (e.g., on-road cars and trucks, and off-road ATVs) and heavy equipment, which would result in very minor and temporary increases in PM₁₀, ROG, NO_x, and carbon emissions relative to Alternative A. Carbon emission reduction measures and other “green” activities would be implemented to partially reduce the carbon footprint emissions of refuge activities, as well as ROG and NO_x emissions from reduced vehicle trips, which partially offset the increase in emissions associated with increased visitor access and volunteer programs. Implementing these measures would help the Service meet its Climate Change policy objectives for reducing the carbon footprint from refuge staff activities. The overall net effect on air emissions from all activities under Alternative B (e.g., prescribed burning for habitat management, more intense habitat management, and vehicle emissions [visitors, volunteers, and workers]) would result in a minor adverse impact to air quality relative to current management activities and visitor access under Alternative A, given the adoption of BMPs previously discussed (see Appendix 1 of the EA).

4.3.2.3 Alternative C

Implementing Alternative C would result in minor adverse effects to air quality. Management activities that would generate additional air emissions under Alternative C include: establishing fire breaks and maintenance of potential condor roosting sites and enhanced volunteer activities. Establishing fire breaks around potential condor roosting sites would increase pile burning activities relative to Alternative A. Such activities would be conducted in accordance with restrictions and prescriptions specified in burning permits, as well as in close coordination with the San Joaquin Valley Unified Air Pollution Control District in order to reduce regional effects (see Appendix 1 of the EA). Minor clearing activities would result in temporary increases in exposed soil, which would increase fugitive dust emissions, particularly during strong winds. Also, increased habitat management and volunteer activities would result in increased use of vehicles (e.g., on-road cars and trucks, and off-road ATVs) and heavy equipment, which would result in very minor and temporary increases in PM₁₀, ROG, NO_x, and carbon emissions relative to Alternative A. The overall net effect on air emissions from all activities under Alternative C (e.g., additional pile burning, more intense habitat management, and vehicle emissions [volunteers and workers]) would result in a minor adverse impact to air quality relative to current management activities and visitor access under Alternative A, given the adoption of BMPs previously discussed (see Appendix 1 of the EA). As compared to Alternative B, air emissions under Alternative C would be slightly lower given the lower levels of burning (i.e., no prescribed understory burning for old growth forest habitat management) and the refuge remaining closed to public use (i.e., no visitor trips).

4.3.3 Noise – Blue Ridge NWR

4.3.3.1 Alternative A – No Action

There are negligible noise effects from current activities under Alternative A in the vicinity of Blue Ridge NWR, given the limited management activity at the refuge and it being closed to public use. The general public in the vicinity of access roads to the Blue Ridge NWR would experience no appreciable changes in noise associated with the infrequent trips to the refuge for limited habitat management activities. Given the refuge’s remote location and restricted access, only negligible changes in traffic related noise would occur. Furthermore, these noise effects are similar to levels experienced by these residents from other traffic along these access roads. There are no sensitive receptors located near the refuge (closest sensitive receptor is a school along Balch Park Road north of Springville, over 15 miles away). Therefore, only negligible effects would occur from continuation of current management practices under Alternative A.

4.3.3.2 Alternative B

Increased management and visitor activities under Alternative B would result in limited increases in local traffic, which would result in very minor and infrequent increases in noise levels during certain time periods for a short duration along access roads to the Blue Ridge NWR. Providing limited public access and establishing interpretative hiking trails under Alternative B would result in additional visitation and traffic related noise to Blue Ridge NWR. The change in noise for Alternative B would be negligible relative to current management activities under Alternative A.

4.3.3.3 Alternative C

There are negligible noise effects from Alternative C in the vicinity of Blue Ridge NWR, given the limited management activity at the refuge and that it is closed to public use. The general public in the vicinity of access roads to the Blue Ridge NWR may experience a slight increase in noise associated with increased management activities and volunteer efforts at the refuge. In any event, given the remote location and closed status, only negligible changes in traffic related noise would occur under Alternative A relative to current management activities and visitor access.

4.3.4 Water – Blue Ridge NWR

4.3.4.1 Common to All Alternatives

All alternatives would include ground disturbing activity associated with pile burning along WUI and roads according to the current Fire Management Plan and other maintenance activities (thinning, mowing, etc.). These activities would result in short-term, localized increases in soil erosion and turbidity of surface water runoff, which could potentially impact intermittent streams and off-site receiving streams. In addition, limited human access, vehicle access, and equipment usage may increase the potential for small releases of oils, grease, and other petroleum products. Soil erosion control measures, avoidance of riparian and wetland habitat, adherence to Service regulations and policy, and BMPs discussed in Appendix 1 of the EA would reduce potential effects to water quality, resulting in only short-term minor adverse effects to water quality. As such, only minor adverse effects to water quality would occur as a result of implementing such actions common to all alternatives.

4.3.4.2 Alternative A – No Action

Continuation of current refuge management practices would have no impact on hydrology and only short-term, localized negligible adverse effects on water quality from soil erosion, given the limited management that occurs at Blue Ridge NWR. There would be no change in the extent of vegetation cover and water management, thus there would be no change in hydrology from continuation of current management measures. Limited vegetation clearing, thinning, and pile burning would occur in accordance with the Fire Management Plan. Such actions would temporarily expose soils resulting in increases in soil erosion, runoff, and localized increases in turbidity levels of surface runoff. Implementation of BMPs outlined in Appendix 1 of the EA would reduce adverse effects to water quality. As such, only minor adverse effects to water quality would occur from implementing Alternative A.

4.3.4.3 Alternative B – Preferred Alternative

Implementing Alternative B would have a short-term, minor adverse effect on water quality and no effect on hydrology. Under Alternative B, more intensive habitat management and invasive species control measures would be implemented (as further discussed in section 4.3.5), condor roost protection, and trail establishment and maintenance to support opening the refuge to public use. These activities could slightly increase the potential for short-term, localized exposure of bare soils resulting in increased soil erosion, runoff, and turbidity in surface water runoff, intermittent streams, and off-site receiving streams. The potential to increase soil erosion would be low because trails would be on existing roads or fire breaks. Roost protection may involve clearing fire breaks around key roost snag trees, exposing soil to erosion in that localized area. Implementation of BMPs outlined in Appendix 1 of the EA would reduce these adverse effects to water quality, resulting in minor and short-term adverse effects. Additional monitoring, coordination (e.g., climate change and adaptive management), and mapping of water resources and flow regimes would provide some long-term benefits to water resources through adaptive management. Overall, there would be minor, short-term adverse impacts to water quality and no impacts to hydrology from implementing Alternative B relative to Alternative A.

4.3.4.4 Alternative C

Under Alternative C, similar minor, short-term adverse effects to water quality previously described for Alternative B would occur from implementing Alternative C. Potential soil erosion associated with construction of a small wind/rain gauge weather station (25 square feet) would be minimized by implementation of BMPs discussed in Appendix 1 of the EA. The refuge would remain closed under

Alternative C; therefore, there would be less trail and road maintenance activities and soil erosion relative to Alternative B. No effects would occur to hydrology. Overall, there would be minor, short-term adverse impacts to water quality and no impact to hydrology from implementing Alternative C relative to Alternative A. In general, Alternative C would result in slightly more positive effects to water quality as compared to Alternative B due to the refuge remaining closed and reducing vehicle access.

Effects on the Blue Ridge NWR Biological Environment

4.3.5 Vegetation – Blue Ridge NWR

4.3.5.1 Common to All Alternatives

All alternatives would include pile burning along WUI and roads according to the current Fire Management Plan, as well as limited mechanical vegetation removal for maintaining fire breaks and road access, as necessary. Such actions would prevent re-growth of vegetation in these areas, which would have either no effect or only a minor adverse effect on plant communities and the extent of vegetation cover that currently exists, depending on the extent of fire control and access as noted for each alternative. Since Blue Ridge NWR is in a fire-prone environment, such wildfire prevention measures may reduce the probability for more severe wild fires from occurring (stand replacement fires may result in replacement of the dominant vegetation species, reduction in above ground vegetation biomass, and reduction in vegetation biodiversity) (Telfer 2000).

4.3.5.2 Alternative A – No Action

Overall, there would be no appreciable impact to native plant species and communities from continuation of current management activities under Alternative A, given the limited management that occurs at Blue Ridge NWR. Limited vegetation clearing, thinning, mowing, and disking would continue for reducing fuel loads in accordance with the Fire Management Plan. Such actions would prevent regrowth of vegetation in these areas; however, there would be no net change in the plant communities or extent of vegetation cover that currently exists. In the long term, such actions may prevent more severe adverse impacts to vegetation from occurring by reducing the potential for more destructive wildfires to occur (Telfer 2000).

4.3.5.3 Alternative B – Preferred Alternative

Implementing Alternative B would have both minor positive and negative effects on native plant species and plant communities. Under Alternative B, pile burning would be continued and prescribed burning and thinning would be conducted in the mixed conifer forest to develop old-growth forest characteristics, native plant diversity, and fire-resilient conditions beneficial to special status species. In addition, updates to the Fire Management Plan would be made and implemented to improve re-establishment of natural fire regimes and fuel treatment for forest and shrub habitats at Blue Ridge NWR, to include mixed conifer forests, scrub, riparian, and foothill woodland habitats. Such measures may help restore more natural plant communities and biodiversity, resulting in additional positive benefits, which will be tested through additional monitoring and adaptive management. Woodland areas, dominated by California black oak (*Quercus kelloggii*), and the mixed conifer forest community, dominated by ponderosa pine (*Pinus ponderosa*), black oak, and other tree species, are adapted to low intensity wildfires, recover rapidly, and can benefit from prescribed burning (van Wagtendonk et al. 1972, Fryer 2007). On the other hand, scrub habitat dominated by whiteleaf manzanita (*Arctostaphylos viscida*) and chamise (*Adenostoma fasciculatum*) may be adversely impacted by prescribed burning and wildfires (Howard 1992; McMurray 1990). Avoidance of scrub habitat and use of low intensity fires may mitigate adverse impacts to this habitat type. Additional surveys, research (with associated SUPs to minimize any short-term effects), IPM planning (to include feral pigs, bark beetle, and other pests), agency coordination (e.g., U.S. Forest Service, BLM), and adaptive management would be conducted, which would likely result in long-term positive benefits for plant communities as these efforts are integrated into future habitat management decisions, considering the potential effects of climate change. On the other hand, maintaining the current quantity and quality of condor forage sites, establishing interpretative hiking trails on existing roads and fire breaks, and implementation of Recovery Program roost management sites would have very localized

minor adverse impact to vegetation that must be cleared or disturbed. Expanded volunteer programs would also provide additional labor to assist the Service in achieving management goals for improving and conserving plant communities, although additional intrusion could increase the potential for spreading invasive species. Overall, the net effect on vegetation from all management activities under Alternatives B is likely to result in both minor positive and negative impacts to native plants and communities relative to Alternative A.

4.3.5.4 Alternative C

Implementing Alternative C would have both minor positive and negative effects on native plant species and plant communities. Under Alternative C, similar effects to plant communities previously described for Alternative B may occur through implementation of habitat management measures, including pile burning and prescribed burning and thinning for habitat management (to restore old growth habitat quality); IPM planning; and additional planning, research, and monitoring. An expanded snag management program would be implemented under Alternative C, which would result in additional vegetation being cleared to protect snags from future fire damage. In addition, Alternative C includes vegetation clearing for a small wind/rain gauge weather station (25 square feet), which would have a negligible effect on vegetation. Since the refuge would remain closed under Alternative C, certain trails and roads may not be maintained and cleared as they would have under Alternative B. Expanded volunteer programs would also provide additional labor to assist the Service in achieving management goals for improving and conserving plant communities, although additional intrusion could increase the potential for spreading invasive species. Overall, the net effect from all management activities under Alternatives C would result in both positive and negative impacts to plant communities relative to Alternative A. In general, there is no appreciable net difference in the impact of Alternatives B and C on plant communities, as both involve lower intensity management actions that would slightly increase or decrease vegetation in different locations.

4.3.6 *Wildlife Resources – Blue Ridge NWR*

4.3.6.1 Alternative A – No Action

Overall, there would be no impact to wildlife resources from continuation of current management activities under Alternative A, given the limited management that occurs at Blue Ridge NWR presently. Limited habitat management to control fuel loads near WUI and roads would maintain current habitat conditions for wildlife. Only minor adverse short-term impacts are expected from implementation of the current Fire Management Plan. In the long term, continued implementation of the plan may prevent more severe adverse impacts to wildlife from occurring by reducing the potential for more destructive wildfires in the future. Severe wild fires (e.g., stand-replacement fires) can eliminate important habitat for many species of birds and small mammals, expose wildlife to predators, and reduce browsing opportunities for some wildlife species for many years (CalPIF 2000; CalPIF 2004; Lyon et al., 2000a,b). Although severe wildfires may eliminate habitat for some species, they can create habitat for others.

4.3.6.2 Alternative B – Preferred Alternative

Implementing Alternative B would have minor positive and negative effects on wildlife resources. Under Alternative B, more intensive prescribed burning and thinning would be conducted in the mixed conifer forest to develop old-growth forest conditions, which may result in long-term benefits to targeted wildlife species that favor old-growth forest conditions, while habitat for other wildlife species may be reduced resulting in minor adverse effects to non-target wildlife species. Reestablishment of natural fire regimes and fuel treatment for forest and shrub habitats at Blue Ridge NWR may also help restore habitat quality for targeted wildlife species in ponderosa pine or mixed conifer forests, scrub, riparian, and foothill woodland habitats, including many California Partners in Flight focal species, as further discussed in section 4.3.7.2 (CalPIF 2002a; CalPIF 2002b; CalPIF 2004). Overall, additional wildlife surveys, habitat management, research (with associated SUPs to minimize any short-term effects), IPM planning (to include feral pigs control measures to reduce disease vectors that can kill mountain lions and destroy habitat, bark beetle control, and other pests), additional agency coordination, implementation of an Avian Monitoring Plan, and climate change planning may provide long-term positive benefits for targeted

wildlife across Blue Ridge NWR, as such efforts would improve long-term management of the refuge. Habitat management and enhanced road/trail maintenance would also result in localized minor adverse, in the short term, and either positive or negative effects on other wildlife species in the long term depending on their specific habitat requirements. The Service would apply an adaptive management approach and I&M to evaluate the long-term effects of habitat changes to help meet refuge goals and objectives, potentially maximizing benefits for targeted native wildlife species and special status species (when present), as discussed in section 4.3.7 of the CCP.

Opening a portion of the refuge to visitors for non-consumptive recreational use would also result in minor disturbances to wildlife. Human activity during wildlife photography, observation, and volunteer activities has the potential to alter wildlife behavior (e.g., modify singing in birds, repeated flushing), increase energy expenditures, reduce reproductive success, alter distributions (sometimes away from higher quality habitat), reduce habitat quality, and serve as vectors of invasive species (Belanger and Bedard 1990; Dobb 1998; Glinski 1976; Gutzwiller et al. 1997; Klein 1993; Knight and Cole 1995; Miller et al. 1998; Morton 1995; Morton et al. 1989; Purdy et al. 1987; and Smith and Hunt 1995). These effects would be minor, short-term, and localized given the expected low level of visitation to the refuge given its location and restrictions for refuge access (e.g., access restricted to trails and designated areas and specific time periods, no dogs, and avoidance of sensitive areas to minimize impacts to wildlife).

Overall, the net effect on wildlife resources from all management activities under Alternatives B would likely result in net positive impacts to targeted wildlife resources in the long term relative to Alternative A, with the potential for minor short-term and long-term adverse effects, particularly for non-targeted wildlife species that favor current conditions.

4.3.6.3 Alternative C

Implementing Alternative C would have minor positive and negative effects on wildlife resources at Blue Ridge NWR. Under Alternative C, similar effects to wildlife resources previously described for Alternative B may occur from implementation of habitat management measures, IPM planning, and additional planning, research, and monitoring. An expanded snag management program would be implemented under Alternative C, which would result in additional habitat loss to protect snags from future fire damage. In addition, Alternative C includes vegetation clearing for a small wind/rain gauge weather station (25 square feet), which would have a negligible effect on wildlife habitat. Since the refuge would remain closed to public use under Alternative C, wildlife resources would be less disturbed, and reduced maintenance activities may enhance certain habitat conditions for wildlife, as compared to Alternative B. Expanded volunteer programs would also provide additional labor to assist the Service in achieving management goals for improving and conserving wildlife resources, although additional intrusion could increase the potential for wildlife disturbances. Overall, the net effect from all management activities under Alternatives C would likely result in positive impacts to targeted wildlife resources relative to Alternative A, with the potential for minor short-term and long-term adverse effects, particularly for non-targeted wildlife species that favor current conditions. Since the refuge would remain closed, Alternative C may yield slightly higher positive benefits to wildlife resources as compared to Alternative B.

4.3.7 Special Status Species – Blue Ridge NWR

As discussed in section 3.3.7 of the CCP, special status species that may occur at Blue Ridge NWR include 3 plant species: Kaweah brodiaea (*Brodiaea insignis*), which is listed by California as endangered; Springville clarkia (*Clarkia springvillensis*), which is federally listed as endangered; and striped adobe-lily (*Fritillaria straita*), which is ranked by the California Native Plant Society as a 1B.1 Rare Plant (considered seriously endangered in California). The first 2 species are found exclusively in the foothill woodland plant community, but they have not been specifically identified at Blue Ridge NWR. Surveys would be needed to determine if these plants are present at the refuge. Due to a lack of comprehensive survey data, it is possible that other special status plant species, including rare plants, may be located at Blue Ridge NWR.

The California condor and its designated critical habitat occur on Blue Ridge NWR. Federally-listed species for which there may be habitat, but the species are not known to occur at the refuge are: the endangered Springville clarkia and the threatened California red-legged frog (*Rana draytonii*). Candidate species for which there may be habitat, but the species is not known to occur at the refuge include: fisher (*Martes pennanti*). The database of Federal Endangered and Threatened Species that may be affected by activities in the area of the refuge also includes the threatened valley elderberry longhorn beetle (*Desmocerus californicus dimorphus*) and delta smelt (*Hypomesus transpacificus*). Although habitat exists on the refuge for the valley elderberry longhorn beetle, based on the range of the species, the beetle is not expected to occur on the refuge. There is no habitat for the delta smelt or the proposed endangered northern California distinct population segment of the mountain yellow-legged frog (*Rana muscosa*) at Blue Ridge NWR.

California Partners in Flight focal bird species that have been observed on Blue Ridge NWR include the dark-eyed junco (*Junco hyemalis*), fox sparrow (*Passerella illiaca*), greater roadrunner, mountain quail (*Callipepla californica*), northern harrier, olive-sided flycatcher, prairie falcon, and western bluebird.

4.3.7.1 Common to All Alternatives

To avoid, minimize, and reduce adverse impacts to special status species, several BMPs have been developed as further detailed in Appendix 1 of the EA. For example, for alternatives, the following BMPs would be employed to protect special status species when threatened by proposed activities: 1) using an adaptive management approach, trails, roads, and/or areas would be closed to ensure that human access does not disturb special status species; and 2) prior to habitat and ground disturbing activities, potential habitat for special status species would be evaluated and, if appropriate, presence/absence surveys and additional mitigation measures taken (e.g., avoid location, change timing of action), if necessary, to ensure that planned activities do not disturb special status species. In addition, the Service would comply with all terms and conditions resulting from Section 7, Endangered Species Act consultation when specific projects are undertaken.

4.3.7.2 Alternative A – No Action

There would be no impact to special status species from continuation of current management activities under Alternative A, given the limited management that occurs at Blue Ridge NWR presently. Currently, condors have not returned to use their traditional roost sites at Blue Ridge NWR.

4.3.7.3 Alternative B – Preferred Alternative

Implementing Alternative B would have a long-term minor positive effect on California condors and other special status species, if and when they occur in the area. Under Alternative B, several condor management activities would be employed, including: management of potential roost sites; enhancement of foraging habitat; expansion of monitoring efforts; coordination to reduce microwave and communication tower impacts; coordination with BLM and other partner agencies to replace, maintain, and protect condor roosting trees over the long-term in the region; minimize human disturbance; and utilize adaptive management to reduce climate change effects on condor habitat. If the condors return to their traditional roosting areas at Blue Ridge NWR, then such efforts would provide a long-term minor positive effect and enhance condor recovery goals. In that event, opening a portion of the refuge to visitors for non-consumptive recreational use would be mitigated by closing areas and trails to ensure that condors are not disturbed. In the past, research has shown that captive bred condors may be more susceptible to human behavior causing higher potential for injury (Meretsky et al. 2000), although more recent research has shown that this effect has decreased as the wild population of condors becomes older (Cade et al. 2004). For other special status species, presence and absence surveys would be performed for Springville clarkia, Kaweah brodiaea (*Brodiaea insignis*), and other special status species that have the potential to occur at Blue Ridge NWR (including other rare plant species). If present, management measures would be implemented to mitigate adverse impacts through an adaptive management process. Current forest management measures to restore old-growth forest habitat structure would be expected to benefit special status species, such as the fisher (Meyer 2007) and olive-sided flycatcher (CalPIF 2002b). Restoring natural fire regimes within the refuge would also help maintain more natural scrub and forest

habitat benefiting many California Partners in Flight focal species, such as the dark-eyed junco, fox sparrow, greater roadrunner, mountain quail, northern harrier, prairie falcon, and western bluebird (CalPIF 2002a; CalPIF 2002b; CalPIF 2004). In the long term, such efforts may result in long-term positive benefits to these species, if present. Habitat manipulation has the potential to cause short-term, minor adverse effects to special status species, although adaptive management and mitigation measures would reduce these effects. Overall, the net effect on special status species from all management activities under Alternatives B would likely result in minor positive impacts to these resources (if present now or in the future) relative to Alternative A, with the potential for localized, short-term, minor adverse effects due to habitat manipulation measures.

4.3.7.4 Alternative C

Implementing Alternative C would have a long-term minor positive effect on California condors and other special status species, if and when they occur in the area. Under Alternative C, similar positive benefits to special status species previously described for Alternative B would be achieved through implementation of condor management measures and monitoring. An expanded snag management program would be implemented under Alternative C, which would result in additional benefits to condors by providing additional roosting habitat and increasing protection against fire damage. If the condors return to their traditional roosting areas at Blue Ridge NWR, then such efforts would provide a long-term positive effect and enhance condor recovery goals. Since the refuge would remain closed to public use under Alternative C, there would be added protection to the condors or other yet to be discovered special status species. Overall, the net effect from all management activities under Alternatives C would likely result in positive impacts to special status species relative to Alternative A, with the potential for localized, short-term, minor adverse effects due to habitat manipulation measures (although such impacts would be mitigated using adaptive management, monitoring, and avoidance). Since additional snag management measures would be utilized, Alternative C may yield slightly higher long-term positive benefits to condors as compared to Alternative B.

Effects on the Blue Ridge NWR Socioeconomic Environment

4.3.8 Socioeconomics – Blue Ridge NWR

4.3.8.1 Alternative A – No Action

Alternative A would result in a negligible impact on the local economy, given the limited activity that occurs at Blue Ridge NWR. The refuge would continue to be closed to public use, so there would be no changes in consumptive or non-consumptive recreation activities that could have an effect on the economic environment. The refuge would remain closed to public use, so there would be no changes in recreational activities and visitation to the refuge.

4.3.8.2 Alternative B – Preferred Alternative

Alternative B would result in minor positive impacts to the local economy. Under this alternative, Blue Ridge NWR would experience some increased employment and spending in the local area for materials, construction, and services related to implementation of management measures outlined for Alternative B. Using the EIFS model, the increased employment (estimated to be 2 direct and induced jobs total) and increased expenditures would have a minor positive impact on demographics and the economy of the local area. The increase in total direct and induced sales volume related to the implementation Alternative B totaled approximately \$143,000 per year (reasonable upper-bound expenditures in any given year during the next 15 years) in the local area, with a net increase in direct and induced income of \$73,000 per year. Both of these metrics represent less than a 0.005% change in historical economic activity in Tulare County, which is well within the norms of historic variation in economic activity for this region. These figures, however, do not include economic activity generated by the general public engaging in non-consumptive recreational activity during tours and volunteer efforts at the refuge (e.g., lodging, refreshments, restaurants, fuel, and supplies). Under Alternative B, partial opening of the refuge for visitors, maintaining trails, interpretive signage, outreach, and volunteer activities would increase non-

consumptive recreation activities on the refuge, resulting in minor positive impacts to the local area from a socioeconomic standpoint.

4.3.8.3 Alternative C

Alternative C would result in minor positive impacts to the local economy. This alternative would be more beneficial than Alternative A, but less so than Alternative B. Under this alternative, the refuge would have minor changes to staff (a part-time biologist and law enforcement officer shared with the other refuges within the Refuge Complex), and very minor expenditure changes with the increased management activities. The only planned expenditures would include interpretive signage and posting of a full boundary, resulting in minimal expenditures in the local area. Using the EIFS program, the expected increase in sales volume and income during a year would be slightly less than expected under Alternative B, and would also be less than a 0.005% change in economic activity in Tulare County, which is well within the norms of historic variation in economic activity for this region. The refuge would remain closed to public use under this alternative, so there would be no changes in consumptive or non-consumptive recreation activities that would have an impact on the socioeconomic environment.

4.3.9 Public Use – Blue Ridge NWR

4.3.9.1 Alternative A – No Action

Alternative A would result in no change in public use of the refuge. The refuge would remain closed to public use with periodic security patrols.

4.3.9.2 Alternative B – Preferred Alternative

Alternative B would result in moderate positive benefits to residents through increased recreational opportunities and access. The refuge would offer increased visitation and non-consumptive recreational opportunities by partially opening the refuge to public use for wildlife photography, observation, and interpretation. The visitor services program would include: developing a Visitor Services Plan, establishing interpretative trails using existing roads and fire breaks, developing signage, enhanced outreach materials, enhanced educational activities (goal of 500 local residents educated about the refuge and condor threats within 5 years), and volunteer opportunities (at least 1 volunteer event per year). Such actions would increase non-consumptive wildlife-dependent recreational activities (wildlife observation, photography, hiking, and environmental education). Although recreational activities could be expected to increase, it is difficult to estimate how many additional visitors would come to the refuge, given its remote location. The goal of the refuge is for 500 visitors to gain an appreciation of the refuge in the next 5 years. Enhanced habitat and wildlife management efforts implemented as part of Alternative B may also increase the wildlife-dependent recreational experience of visitors and volunteers engaged in photography or observation. Overall, there would be minor positive benefits to residents through increased recreational opportunities and access from implementing Alternative B relative to Alternative A.

4.3.9.3 Alternative C

Alternative C would result in minor positive benefits to residents through increased recreational opportunities and access. The refuge would remain closed to public use, but with expanded visitation opportunities through increased volunteer patrols and added guided tours. These impacts would be less positive than Alternative B, due to the refuge remaining closed.

4.3.10 Cultural Resources – Blue Ridge NWR

4.3.10.1 Alternative A – No Action

Alternative A would result in no adverse effects to cultural resources, given the limited management activities at the refuge. Since its establishment, the 897-acre Blue Ridge NWR has been closed to public use, and only limited surveys have been conducted on cultural resources in the general area. A 1-acre survey that was conducted in 1984 resulted in no recorded cultural resources. Under Alternative A, the refuge would remain closed to public use. The Service would continue to manage and conserve cultural

resources at Blue Ridge NWR and exercise section 106 of the NHPA, including consultation with the SHPO and pertinent tribes, in order to eliminate or minimize adverse effects.

Potentially adverse effects to cultural resources would be minimized through cultural resource reviews and surveys. All sites discovered in the future would be treated as eligible for listing on the NRHP until listed or formally evaluated as ineligible in consultation with the SHPO. Under federal ownership, archaeological and historical resources within a refuge receive protection under federal laws mandating the management of cultural resources, including but not limited to ARPA, AHPA, NAGPRA, and NHPA. Under all alternatives, if any cultural resources are discovered on the refuge, the Service would take all necessary steps to comply with section 106 of the NHPA, to include consultation with the SHPO and pertinent tribes. By implementing these measures, adverse effects to cultural resources would be minimized. No human remains have been documented on Blue Ridge NWR. However, if archaeological sites are identified in the future, they could be found to contain human remains, funerary items, sacred objects, or items of cultural patrimony and may therefore require consideration under the NAGPRA. The Service will comply with the NAGPRA consultation process and other applicable laws and guidance required for consideration of human remains.

4.3.10.2 Alternative B

Alternative B may result in minor adverse effects to cultural resources. Alternative B includes developing a Visitor Services Plan and partially opening up the refuge to visitors, which includes establishing hiking trails and installing boundary and interpretive signage at key locations. In addition, this alternative includes habitat management, limited construction, and other activities that may disturb and expose soils. Actions that physically disturb a site, alter its setting, or introduce elements out of character with the site may constitute an adverse effect. Since only limited cultural resources assessments have been conducted in the Blue Ridge NWR, it is reasonable to assume that additional archaeological sites would be exposed by human actions or natural causes in the future. Potential adverse effects to cultural resources would be fully determined when specific and detailed project plans are available. The Service would follow the same process to comply with section 106 of the NHPA, NAGPRA, and other applicable laws as described in section 4.3.10.1 when ground disturbing activities are proposed.

4.3.10.3 Alternative C

Alternative C may result in minor adverse effects to cultural resources. Under Alternative C the refuge would remain closed, but this alternative includes habitat management, limited construction, and other activities that may disturb and expose soils. As with Alternative B, potential adverse effects to cultural resources would be fully determined when specific and detailed project plans are available. The Service would follow the same process to comply with section 106 of the NHPA, NAGPRA, and other applicable laws as described in section 4.3.10.1 when ground disturbing activities are proposed.

4.3.11 Environmental Justice (Common to all Alternatives) – Blue Ridge NWR

On February 11, 1994, the President issued Executive Order 12898 *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* – requiring that all federal agencies achieve environmental justice by “identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority population and low-income population.” Environmental justice is defined as the “fair treatment for peoples of all races, cultures, and incomes, regarding the development of environmental laws, regulations, and policies.”

The mission of the Service is working with others to conserve, protect, and enhance fish and wildlife and their habitats for the continuing benefit of the American people. The developing environmental justice strategy of the Service extends this mission by seeking to ensure that all segments of the human population have equal access to America’s fish and wildlife resources, as well as equal access to information that would enable them to participate meaningfully in activities and policy shaping.

Blue Ridge NWR is located in a remote area with low population density. With respect to poverty levels, the areas around the refuge have slightly higher poverty levels than what is found across the state (23% in Tulare County versus 14.2% in the state of California). In addition, there are slightly higher percentages of Hispanic or Latino populations (61%) near Blue Ridge NWR than what is found at the state level (48%) (U.S. Census Bureau 2011). In any event, due to the nature of the action and the analysis previously discussed, the Service has concluded that the proposed action does not result in disproportionately high and adverse human health or environmental effects to any of the communities around the refuge. Furthermore the Service has concluded that no minority and low-income populations or communities would be disproportionately affected by any of the alternatives. Therefore, there are no environmental justice concerns associated with implementing any of the alternatives.

4.3.12 Cumulative Effects – Blue Ridge NWR

In this section, the cumulative effects of the proposed alternatives are analyzed. Cumulative impacts are considered to be those that result from the incremental effects of the Service's proposed action when added to past, present, and reasonably foreseeable future actions, regardless of the agencies or parties involved. Cumulative impacts can result from individually minor but collectively significant actions occurring over time. For an EA, the cumulative impact analysis is done only to a sufficient level to allow the decision maker to make a determination of significance for the proposed action, as stated in the Service Manual (550 FW 1). Thus, this analysis focuses on whether implementation of the CCP's preferred alternative (Alternative B), or combinations of management measures being considered for other alternatives (i.e., Alternatives A or C), would result in a significant cumulative adverse impact. A summary of these findings are provided here for each aspect of the environment, including the physical, biological, and social environment, as appropriate. Cumulative impacts are considered for a 15-year period for the refuge and the study area (i.e., the refuge and Tulare County), which is the projected time frame for implementing the CCP.

An important component of this analysis is evaluating other past, present, and reasonably foreseeable actions occurring within the study area that may contribute to cumulative effects, as outlined here.

- Regional growth and development over the past decades has increased, and this trend is projected to continue into the future. This growth has resulted in reduced and fragmented habitat throughout the region beyond the boundaries of the refuge, increased traffic generation, soil disturbance, and air emissions in the study area (e.g., population growth in Tulare County has risen by 20.2% from 2000 to 2010 and is expected to double by 2030 [U.S. Census Bureau 2011]). Regional residential development and industrial growth in Tulare County are expected to continue in nearby Visalia and Goshen. General Plans for Visalia and Goshen have been updated for the expansion of residential community developments and a Town Center to the west of the Blue Ridge NWR (Tulare County 2012). In addition, a 10,000-unit planned residential community is proposed that borders the refuge on 36,000 acres.
- Energy projects and other infrastructure projects in the region have increased in the past decades (in the past oil and gas exploration, and more recently renewable energy projects) and additional projects may occur, resulting in reduced and fragmented habitat beyond the boundaries of the refuge, along with increased physical obstructions for birds (e.g., transmission lines maintained by Pacific Gas & Electric [CEC 2011]; oil and gas operations; roads; telecommunication towers; and microwave towers).
- Wildfire risks and intensity has the potential to increase in the coming decades due to climate change and expanded development.

Physical Environment. Minor cumulative adverse impacts on air quality and noise would occur from implementing the proposed action, when added to air and noise impacts associated with increased development in the region, population growth, fugitive ROG emissions from oil and gas operations, and expansion of energy and transportation infrastructure. Increases in fuel efficiency, energy conservation,

and renewable energy usage may partially mitigate for cumulative air quality effects. No additional cumulative effects are expected to geologic resources, soils, and water quality in the study area from implementing the proposed action given the size of the refuge and the limited activities that occur within the refuge.

Biological Environment. Although implementing Alternatives A, B, or C would provide positive benefits to vegetation, wildlife, and potentially special status species, it is unlikely that such actions would offset adverse cumulative effects occurring from other stressors at a regional scale. Expansion of energy and telecommunication infrastructure (e.g., transmission lines, microwave towers [one-half mile northeast of the refuge], and telecommunication towers [4 large towers located less than one-quarter mile east of the refuge]), urban expansion (e.g., 10,000-unit planned residential community that borders the refuge), and expansion of transportation infrastructure in the region have all resulted in cumulative adverse effects to vegetation (e.g., 90% loss of riparian forest communities, loss of woodland habitat, and loss of native grasslands), wildlife, and special status species outlined previously (CalPIF 2000; CNPS 2010; Davis et al. 1995; Germano et al. 2012; Knopf et al. 1988; USFWS 2010). With respect to condor population growth and survivorship, past human activities and other factors have extirpated condors in this location. In the long term, if and when condors begin to reuse this area for roosting, it is likely that implementing Alternatives B or C would result in net beneficial cumulative effects for the condor, with population levels and survivorship increasing during the next 15 years.

Socioeconomic Environment. Cumulative minor beneficial effects may occur to socioeconomics, as development growth, combined with increases in refuge expenditures and activities as proposed in the CCP, would induce additional economics growth for the region (approximately \$143,000 per year in increased employment and spending from direct and induced economic activity). Implementing the proposed action would elevate public awareness and increase regional recreational opportunities, thereby resulting in positive cumulative effects. No cumulative effects are expected for cultural resources and environmental justice concerns.

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 cannot 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 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 known tribes possessing legal property interests held in trust by the United States in the lands or natural resources related to the alternatives.

Related Programs and Environmental Analyses

Programs. California Condor Recovery Program (Recovery Program) activities are funded and conducted separately from but in coordination with refuge operations and management activities. A description of the activities of the Recovery Program can be found in the April 1996 Recovery Plan for the California Condor. The 1996 revised recovery plan modified the previous recovery strategy to emphasize the captive breeding program and intensive efforts to reestablish the species in the wild. Important measures are also prescribed for habitat conservation and public education, but these are secondary to the continued

development of a captive breeding program and reintroduction of captive-bred California condors (USFWS 1996).

Wind energy development projects. The Service is aware of several proposed or existing federal and non-federal wind energy projects in Kern County that fall within the historic range of the California condor. The Service considers the wind energy projects in relationship to the California Condor Recovery Program. More information on wind energy and the Service's draft voluntary wind energy guidelines can be found at www.fws.gov/windenergy. The wind energy guidelines are not a part of this CCP.

Environmental Analyses. April 2010, U.S. Bureau of Land Management, Carrizo Plain National Monument Approved Resource Management Plan and Record of Decision addresses Monument lands located directly to the northwest of the Bitter Creek NWR (BLM 2010).

March 2008 Environmental Assessment for the Bitter Creek National Wildlife Refuge Proposed Habitat Management and Restoration Plan (2008 Bitter Creek EA) is now obsolete. Service staff reviewed the comments that were received in 2008 during the public comment period on the 2008 Bitter Creek EA and compatibility determination. Comments on the 2008 Bitter Creek EA and compatibility determination have been incorporated into the CCP scoping process and are represented in the August 2010 Scoping Summary Report (included in the appendices to the CCP).

Consultation and Coordination with Others

The CCP and EA were prepared with the involvement of technical experts, community groups, and private citizens. The Service has invited and continues to encourage public participation in the public involvement process through project planning updates (newsletters) and the Refuge Complex website.

The Service coordinated with the public during the scoping process for the CCP/EA for the Hopper Mountain, Bitter Creek, and Blue Ridge NWRs. During the winter and spring of 2010, background information about the CCP process was posted to the Hopper Mountain NWR Complex website, circulated via news release, and mailed to known interested parties to gather input. A planning update (newsletter), which introduced the refuges and the planning process, was mailed to over 150 agency and organization representatives, members of the public, media, and elected representatives in Ventura, Kern, San Luis Obispo, and Tulare counties. On April 6, 2010, a Notice of Intent to prepare the CCP/EA and request for comments was published in the Federal Register (Vol. 75, Number 65, pages 17430-17431). In April and May 2010, public scoping meetings were held in Fillmore, Taft, and Porterville, California. In addition to holding public meetings, Service staff responded to a number of letters and emails submitted to the Refuge Complex and/or the Pacific Southwest Region asking for clarification on planning issues. The scoping comment period ended on May 21, 2010. The *Scoping Summary Report* is provided in Appendix K to the CCP. More information about public involvement and the public comment period on the Draft CCP/EA is included in Chapter 2 of the CCP and Appendix K.

During the planning process, the refuge staff continues to actively participate with the various working groups and agency teams concerning the Coast Ranges, southern Sierra Nevada Mountains, Transverse Range, and surrounding areas. The refuge and Pacific Southwest Region staff also met with interested parties and local groups to explain the planning process, and to listen to their concerns. Information newsletters called Planning Updates are also mailed to the public. These periodic publications are created to provide the public with up-to-date refuge planning information and progress on the CCP process, as well as request input throughout the planning process. The Service distributed CCP planning updates in February, April, and August 2010, March 2011, and April 2012.

The Hopper Mountain, Bitter Creek, and Blue Ridge NWRs and Region 8 Refuge Planning have conducted informal consultation with the Sacramento Fish and Wildlife Office and the Ventura Fish and Wildlife Office of the Service under Section 7 of the federal ESA, as amended. In compliance with Section 7 of the federal ESA, as amended, the Service conducted intra-Service Section 7 compliance regarding listed species. See also the Special Status Species sections of this EA and the CCP Appendix E

- Plants and Wildlife; and Appendix F - Section 7, Endangered Species Act Compliance.

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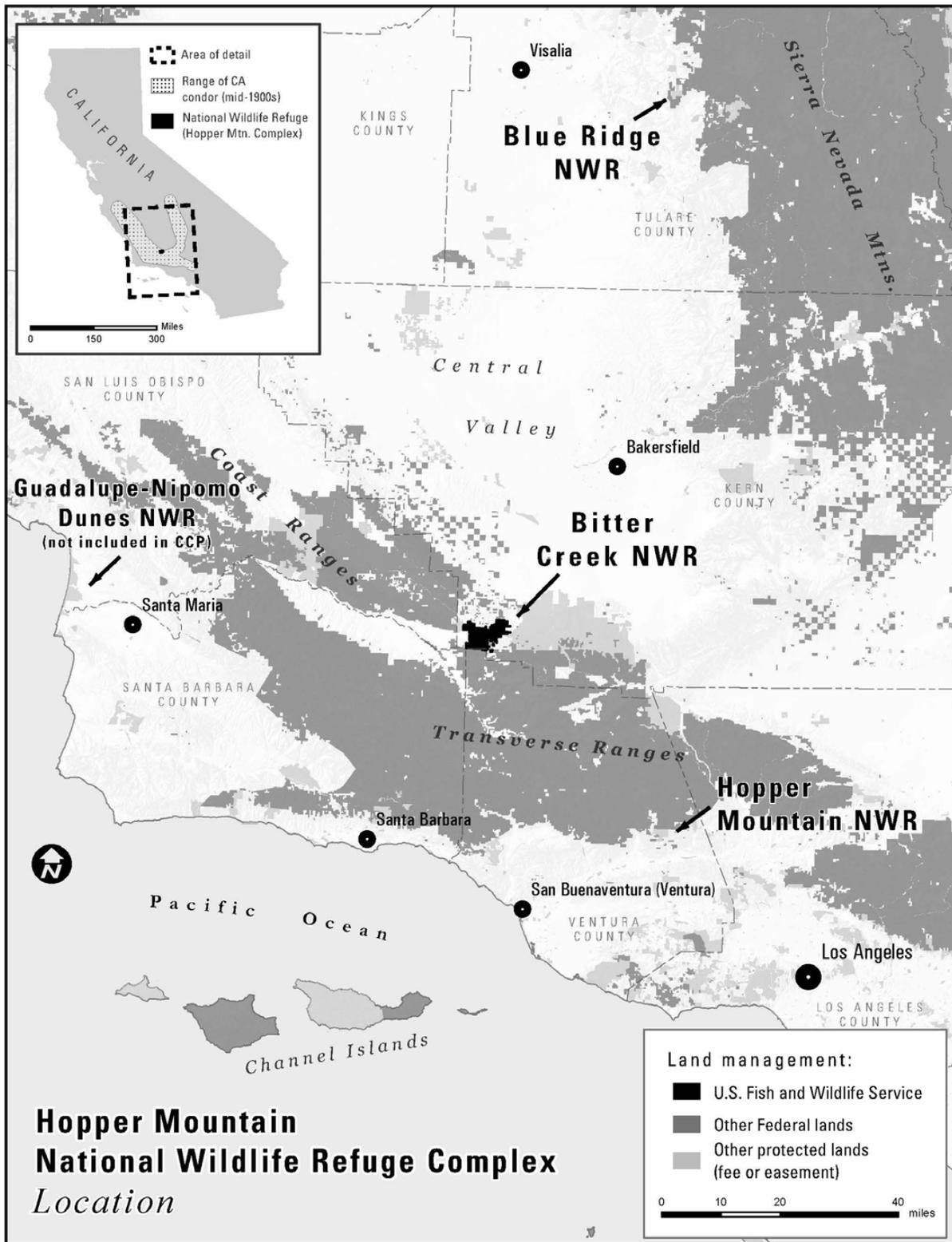
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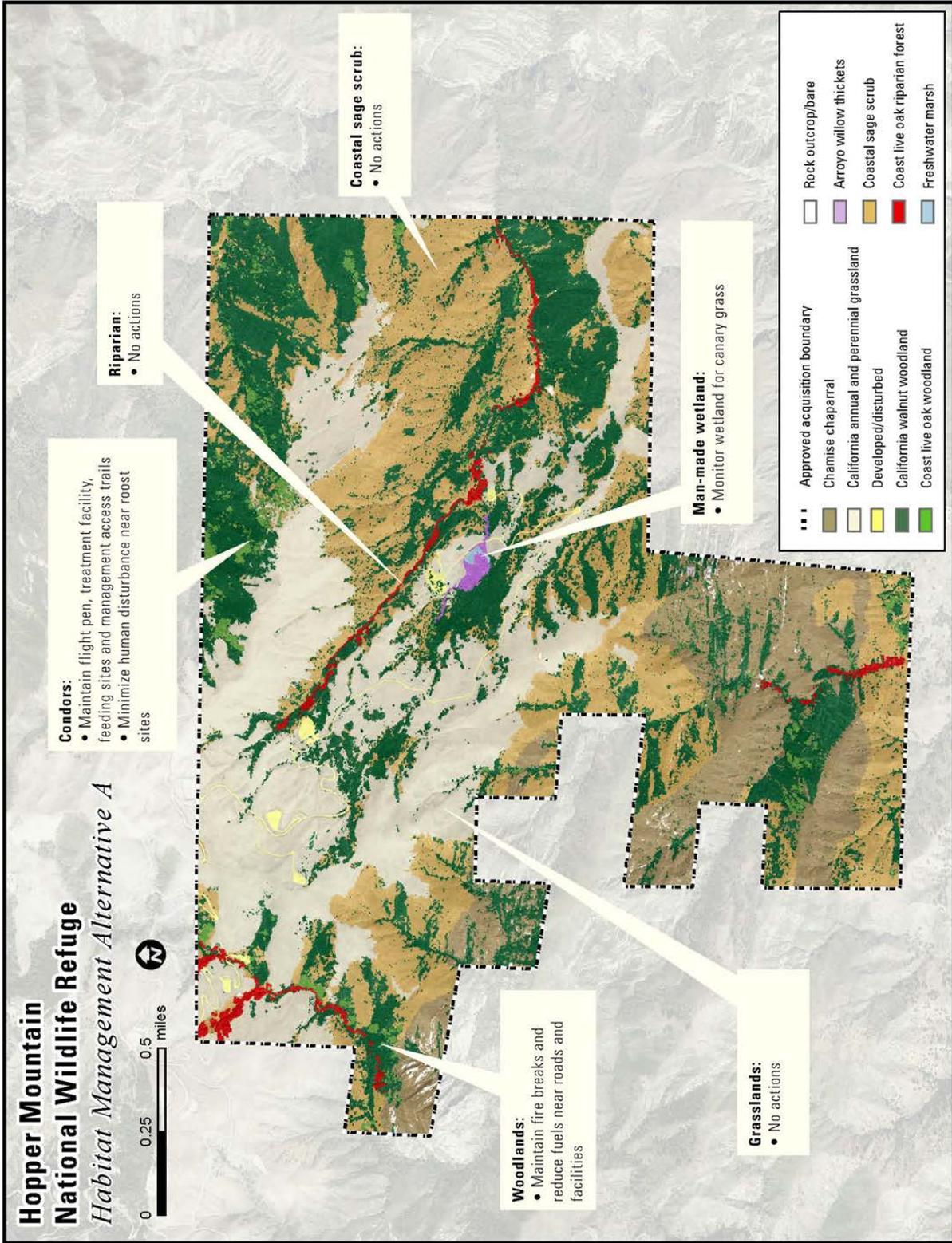
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Figures for the Environmental Assessment

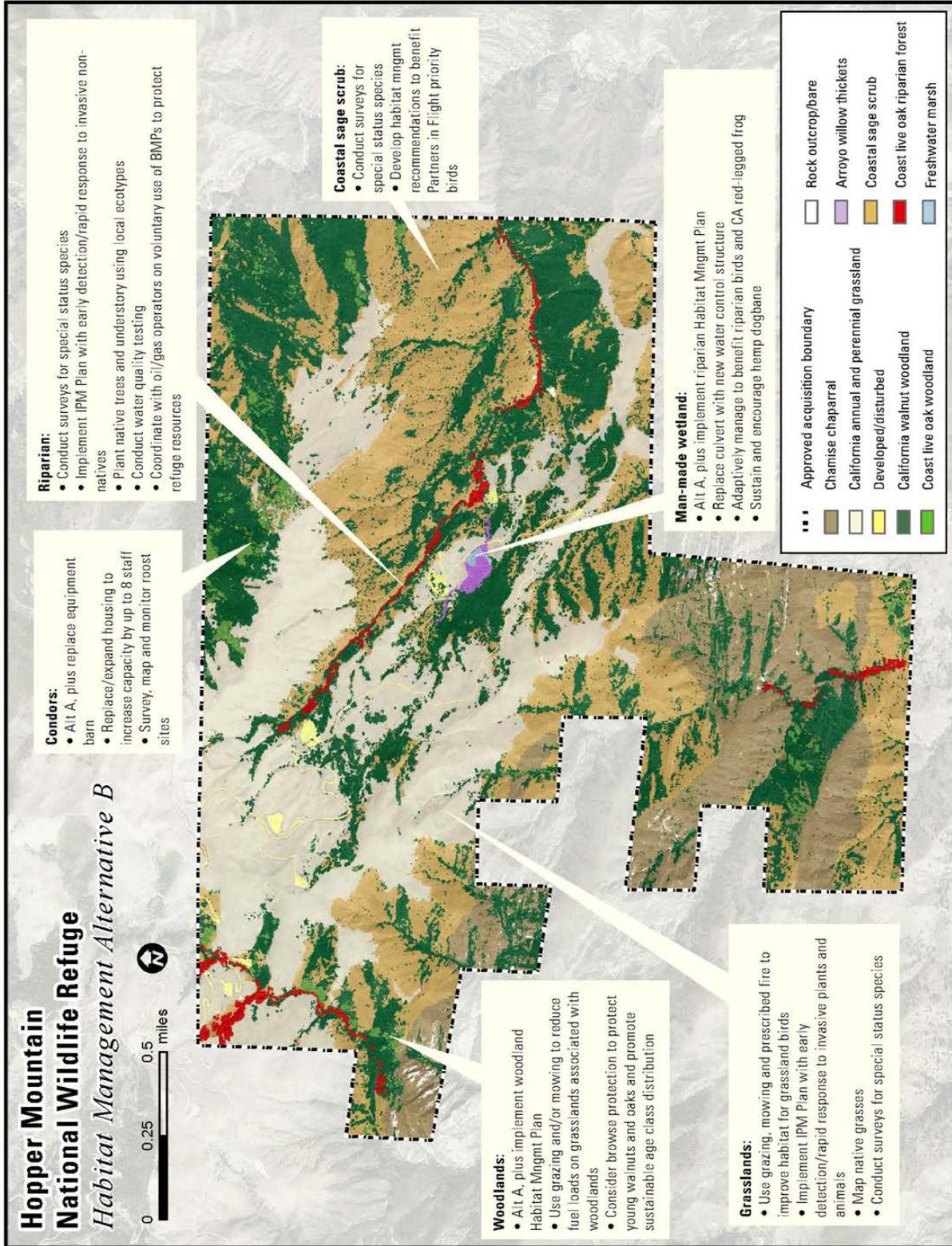
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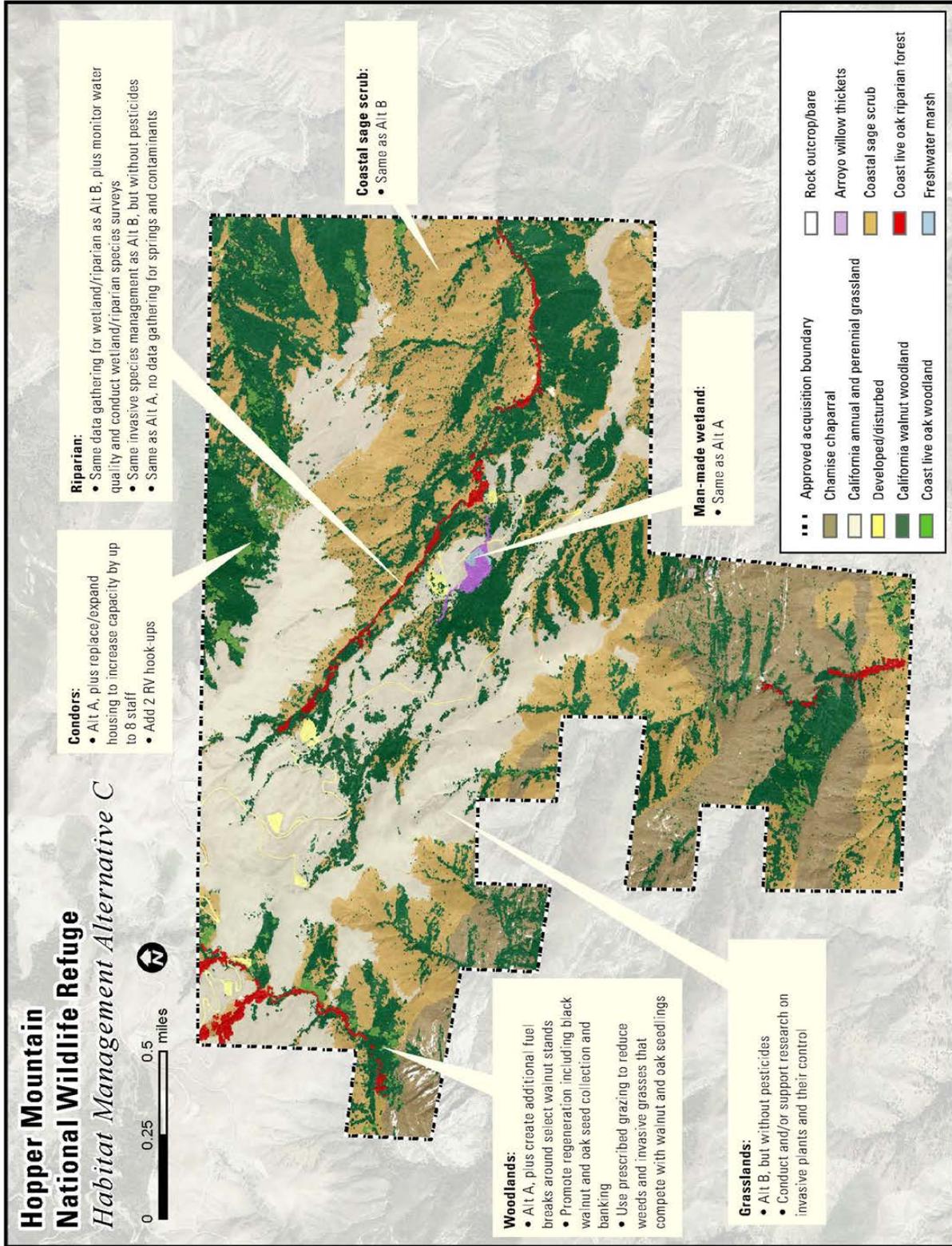
Alternative A – Hopper Mountain National Wildlife Refuge



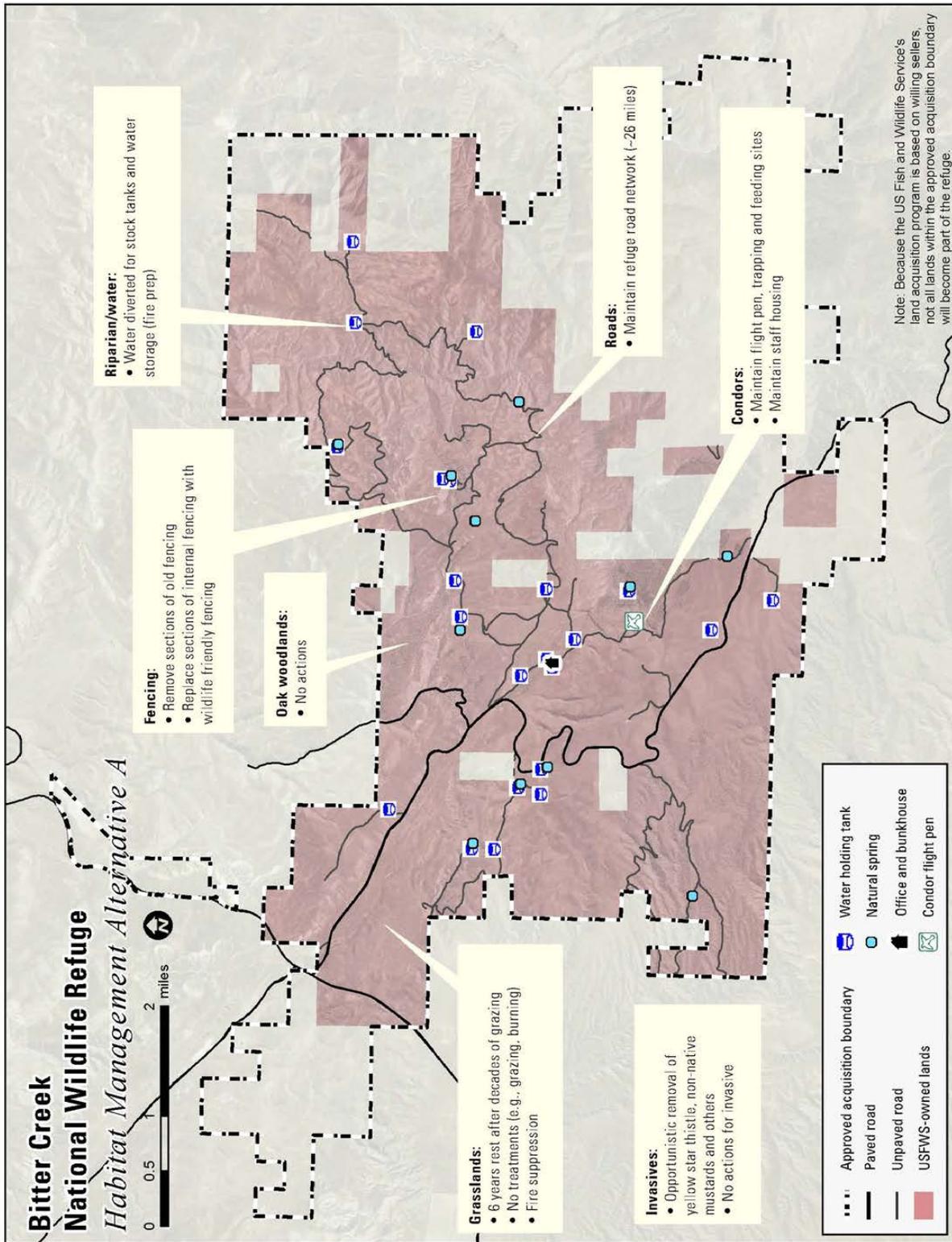
Alternative B – Hopper Mountain National Wildlife Refuge



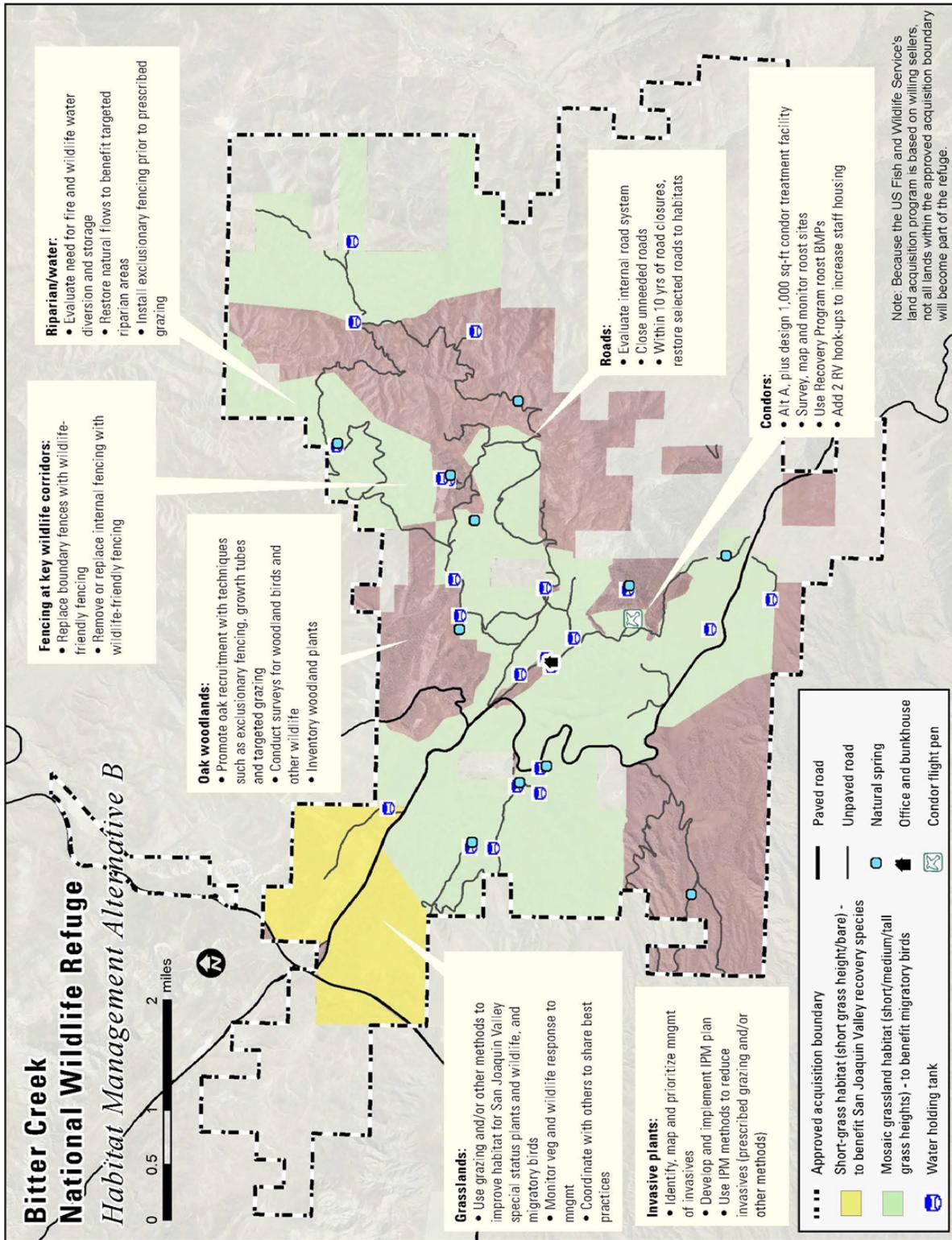
Alternative C – Hopper Mountain National Wildlife Refuge



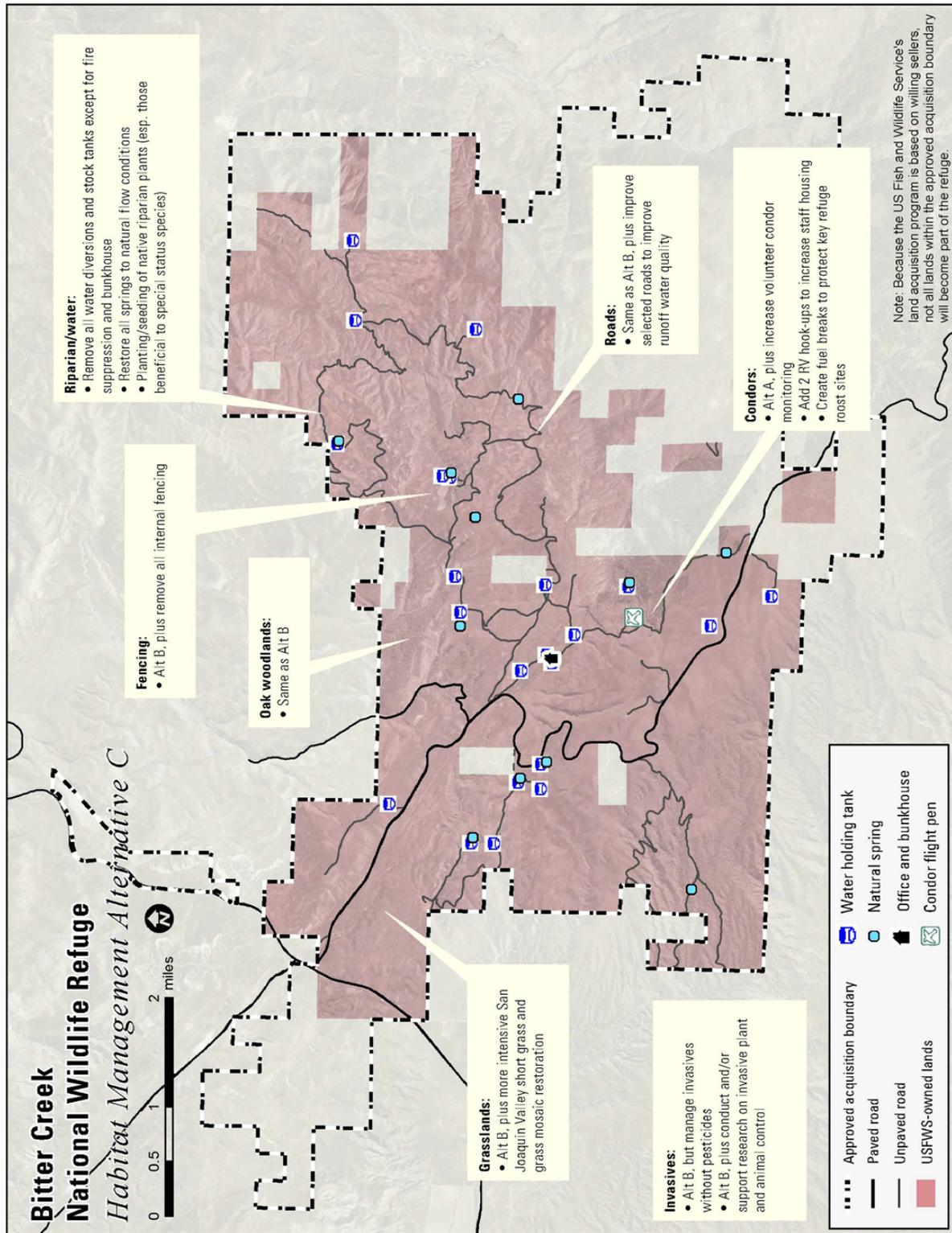
Alternative A – Bitter Creek National Wildlife Refuge



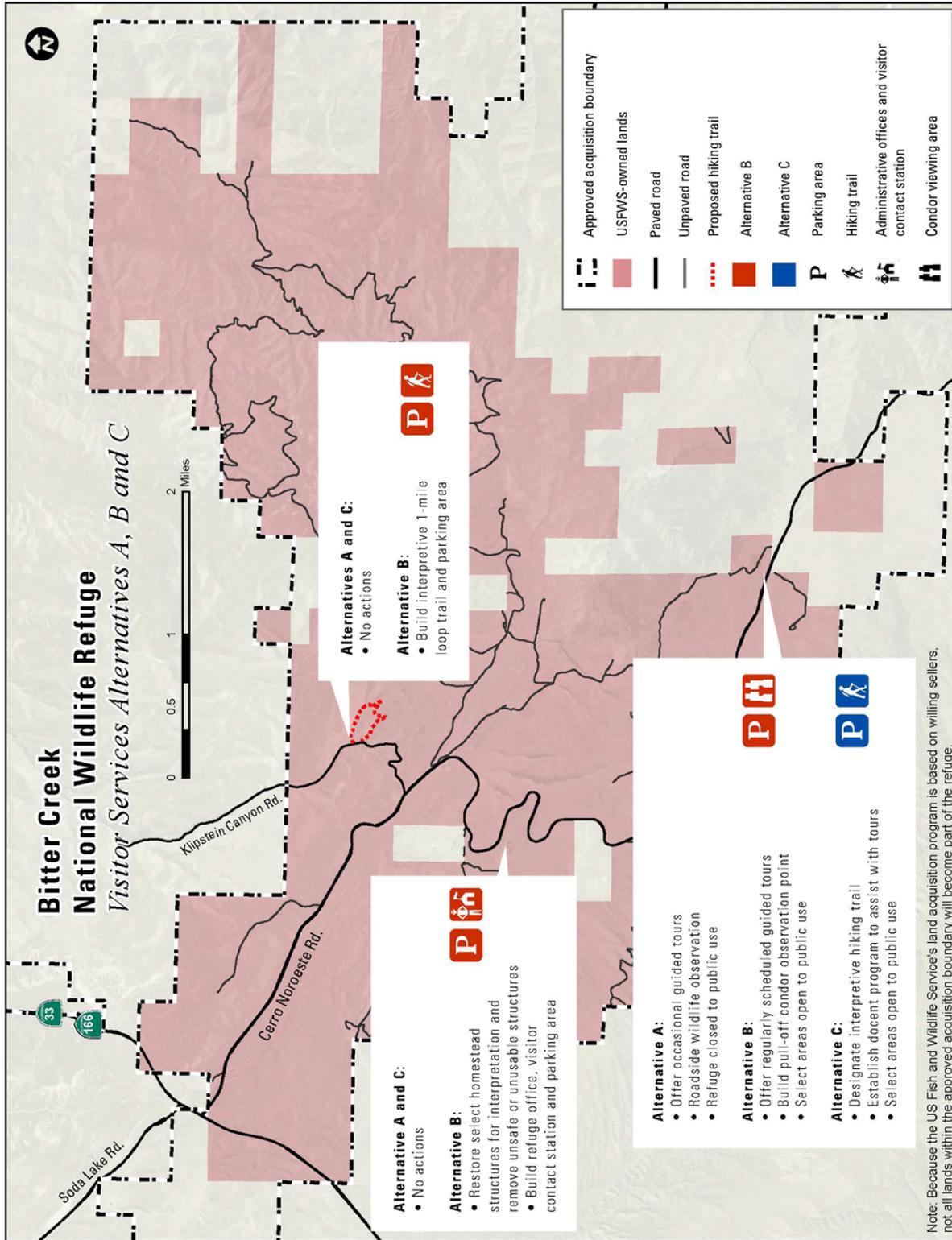
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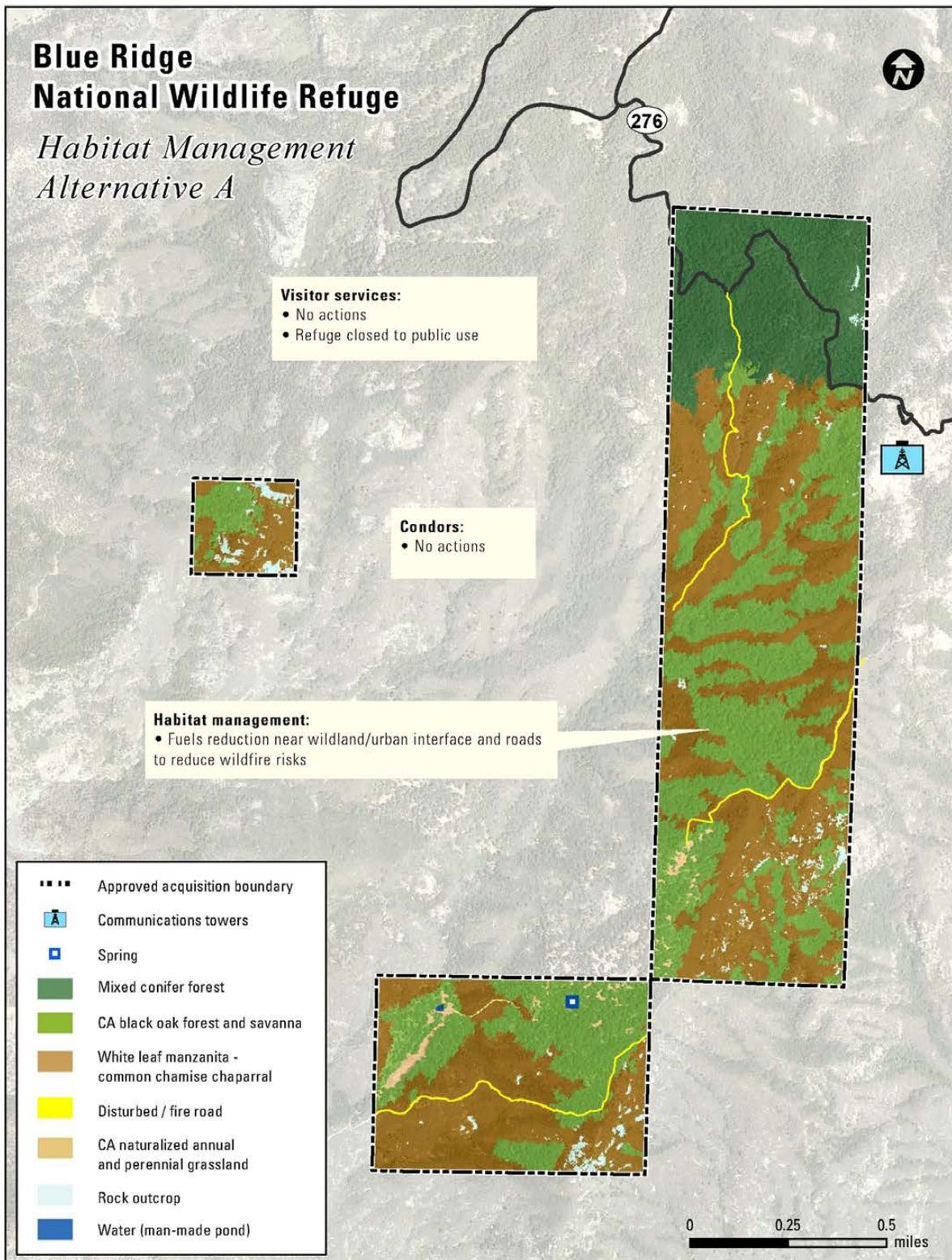
Alternative C – Bitter Creek National Wildlife Refuge



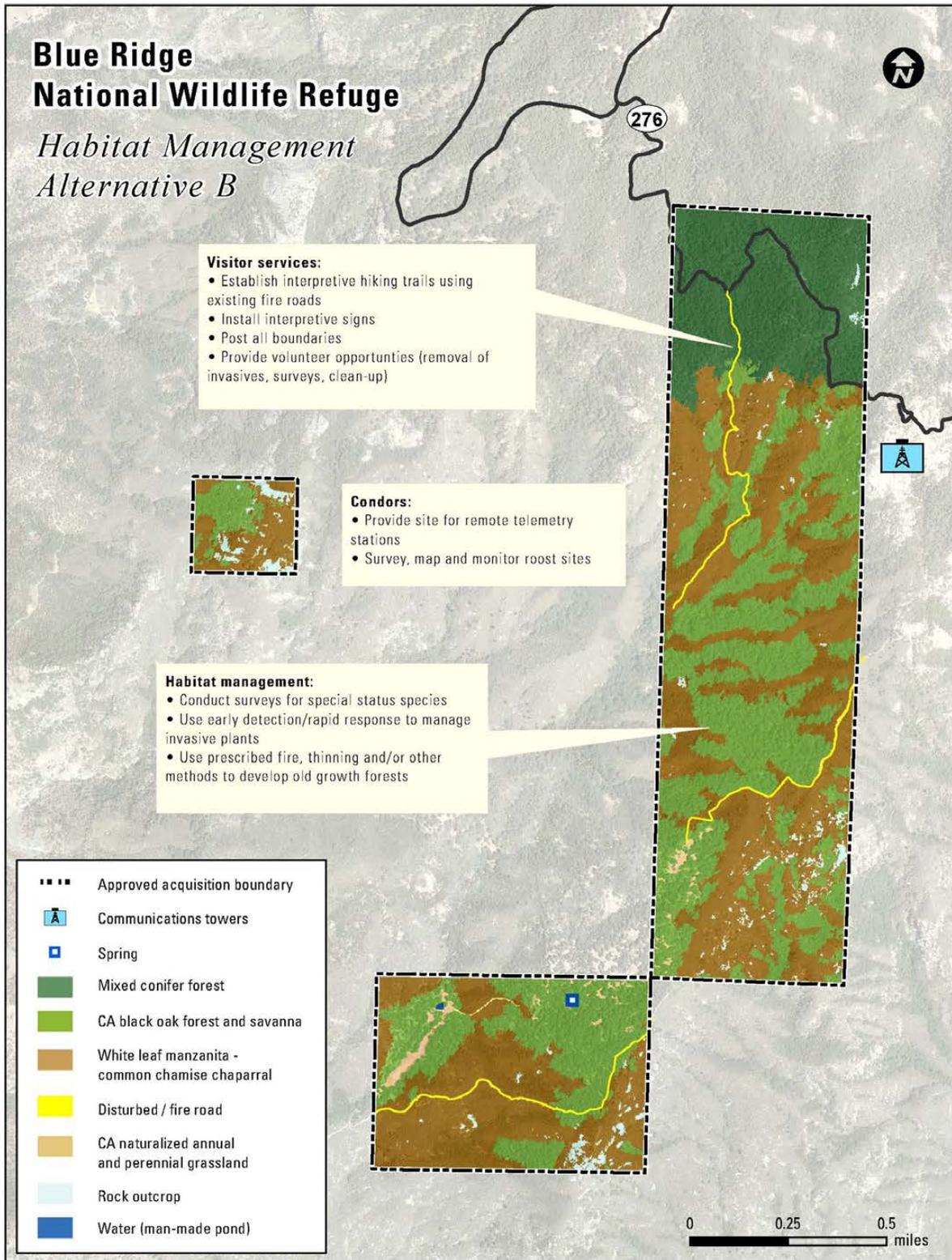
Alternatives A, B and C – Visitor Services, Bitter Creek National Wildlife Refuge



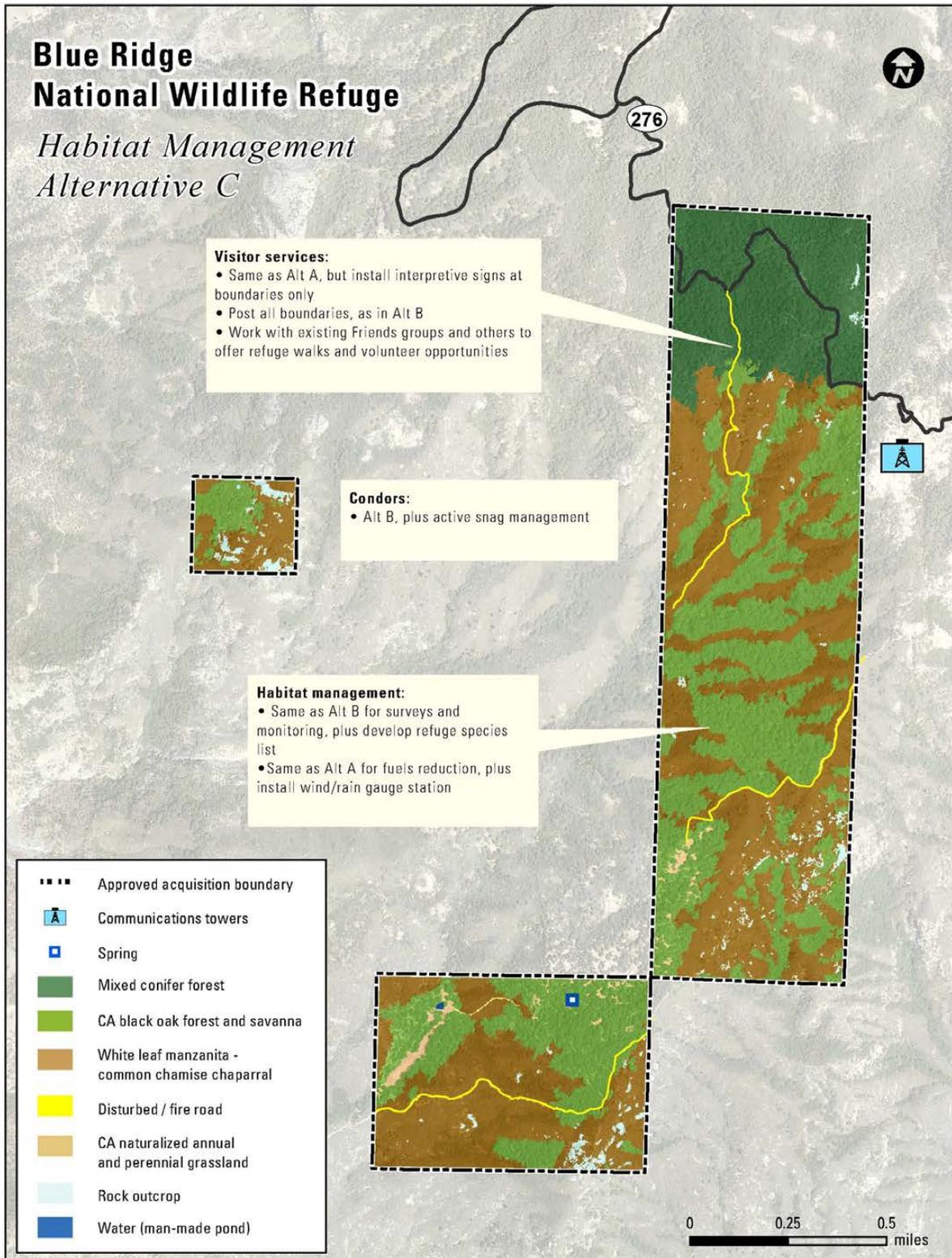
Alternative A – Blue Ridge National Wildlife Refuge



Alternative B – Blue Ridge National Wildlife Refuge



Alternative C – Blue Ridge National Wildlife Refuge



APPENDIX 1: Best Management Practices

Best Management Practices (BMPs) are designed to reduce adverse impacts to wildlife and plants and their critical habitats. BMPs shall be executed by all project coordinators. BMPs are listed by main project categories, but in practice, overlaps do exist among the categories.

General BMPs for all Project Categories:

1. Follow all terms, conditions, and stipulations in regulatory permits and other official project authorizations to eliminate or reduce adverse effects to 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 wildlife species in the immediate project area.
3. 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. Use existing roadways or travel paths for access to project sites.
5. 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.
6. Vehicles and machinery shall cross streams and drainages at right angles to the main channel whenever possible.
7. Excavation or transport equipment/machinery shall 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.
8. Streams, riparian zones, and wetlands shall not be used as staging or refueling areas. Equipment shall be stored, serviced, and fueled away from aquatic habitats or other sensitive areas.
9. Native vegetation shall be planted on disturbed sites in accordance with project specifications. Native vegetation shall be salvaged from areas where ground disturbances will be occurring on projects. Salvaged vegetation shall then be replanted after the completion of project activities. The use of non-native vegetation is prohibited. Restoration planting techniques shall not cause major disturbances to soils and slopes. Hand planting is the preferred technique for all plantings. Plantings shall occur during the optimal seasonal period for the respective plant species involved. Planting site conditions shall be enhanced by bank sloping/grading, seedbed and site preparations, mulching, or fertilizing, as specified.
10. The sources of boulder and rock materials used for restoration projects shall be from non-streambed and non-wetland sources. Conifer and hardwood timber stands shall 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 shall be collected during appropriate seasonal periods to reduce soil and slope disturbances.
11. A written contingency plan shall 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) shall be available on site to cleanup any small scale accidental hazardous spill. Hazardous spills shall be reported. Emergency response, removal, transport, and disposal of hazardous materials shall 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.

12. The evaluation of herbicide, pesticide, and fertilizer use shall 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 shall 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. All chemicals shall be handled in strict accordance with label specifications. Proper personal protection (e.g., gloves, masks, clothing) shall 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 shall only be considered when other treatments would be ineffective or cannot be applied.

13. Sedimentation and erosion controls shall 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 shall be placed and/or anchored appropriately to prevent adverse impacts to down slope habitats. Re-vegetate disturbed areas with native vegetation as soon as possible in accordance with project specifications. 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 fiber logs. Contact the local state forester, state extension service agent, or Soil and Water Conservation District for information or assistance on control structures/techniques.

14. Staging and stockpile areas shall be located on or immediately beside the project area whenever possible. Sediment and erosion controls shall 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 potential to wildlife in the surrounding areas.

15. Excess excavated materials removed during the completion of a restoration activity shall 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 shall 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 shall be implemented to prevent adverse impacts to down slope habitats. Disposal sites should be re-vegetated with native vegetation as soon as possible.

16. Project coordinators shall ensure that all waste resulting from the completion of a project is removed and disposed of properly before work crews vacate the project site.

17. Structures containing concrete or wood preservatives shall be cured or dried before they are placed in streams, riparian zones, or wetlands. No wet concrete or runoff from cleaning tools that have wet concrete slurry or lye dust shall enter aquatic habitats. Runoff control measures shall be employed, such as hay bales and silt fences, until the risk of aquatic contamination has ended.

18. 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, shall be taken to address potential and existing adverse effects to fish, wildlife, and plants.

19. Brightly-colored construction fencing shall be installed around isolated special status plants to avoid disturbance.

20. 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.

21. To protect special status species when threatened by proposed activities the Service will conduct the following activities: 1) trails, roads, and/or areas will be closed to ensure that human access does not disturb special status species using an adaptive management process; 2) prior to habitat and ground disturbing activities, potential habitat for special status species will be evaluated and, if appropriate, presence/absence surveys and additional mitigation measures taken (e.g., avoid location, change timing of action), if necessary, to ensure that planned activities do not disturb special status species; and 3) the Service will comply with all terms and conditions resulting from Section 7, Endangered Species Act consultation when specific projects are undertaken.

Riparian/Wetland and Upland/Woodland Restoration BMPs:

22. Bank stabilizing vegetation removed or altered because of restoration activities shall be replanted with native vegetation and protected from further disturbance until new growth is well established. Native shrubs and trees from local ecotypes shall also be included in the reclamation of disturbed sites. Waste organic materials (e.g., discarded lumber, woody vegetation) shall not be used to stabilize soils and slopes in disturbed areas. Metal refuse or debris (e.g., petroleum containers, car bodies) shall not be used for streambank protection; this violates both state and federal regulations. Also, broken asphalt and tires shall not be used due to potential seepage of petroleum and other toxic chemicals. Concrete is not recommended for bank stabilization projects. In-stream materials (e.g., stream debris and gravels) shall not be used to replace or restore eroded streambanks. Stabilization projects shall employ bioengineering methods to the greatest extent possible.

23. Sedimentation and erosion controls shall be implemented on site at all times during wetland restoration or creation activities to maintain the water quality of adjacent water sources.

24. Restoration activities that require prescribed burning of slash material or invasive vegetation shall be planned in coordination with the refuge manager and in accordance with the approved Fire Management Plan. Non-burning alternatives shall be considered whenever possible.

25. Slash materials shall 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 shall 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.

26. Appropriate timber yarding system shall be used during silvicultural operations to eliminate or reduce soil disturbances and compaction of soils.

27. Snags shall be retained on project sites for cavity dependent wildlife species whenever possible.

28. If abandoned and decommissioned roadways are re-vegetated, native species propagated from on-site sources shall be used in accordance with the Habitat Management Plan. Ensure that drainage patterns on these roadways will not result in increased sedimentation rates or erosion to down slope habitats. Drainage improvements shall be constructed and stabilized before the rainy season. Water energy dissipaters (e.g., water-bars and rolling dips) shall be installed along roadways and on all cross drain

outfalls. Excavated road materials shall not be side-cast or spread in upland draws, depressions, intermittent streams, wetlands, and springs.

29. Seedlings, cuttings, and other plant propagules shall be sourced from reputable suppliers or growers. Hardwood and conifer seedlings have specific storage, handling, and planting requirements different from seedlings. Seeds used to grow seedlings shall be collected on the restoration project site. Seedling competition shall be reduced by clearing grasses, forbs, and woody shrubs from around each seedling for a minimum distance of 3 feet. Appropriate methods shall be employed to protect seedlings from animal, insect, and environmental damages. Planted seedlings shall be periodically examined for damages and diseases. Contact your local state forester or extension service agent for additional information or assistance.

30. 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.

31. When necessary for invasive plant removal or habitat restoration, trees shall be felled away from streams, riparian zones, and wetlands whenever possible. Tree falling on steep slopes shall not be done or done in an appropriate manner to avoid damage to surrounding vegetation and soils. The proper yarding technique shall be employed on project sites to eliminate or reduce soil disturbances and compaction.

32. Fence designs (e.g., wire type and wire spacing) and installations shall not restrict the movement of any wildlife species; the use of woven wire fences shall be subject to the approval of the refuge manager. The quality and durability of fencing materials shall meet or exceed the intended management objectives. Fences shall 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.

33. Livestock crossings and off-channel livestock watering facilities shall not be located in areas where compaction and/or damage may occur to sensitive soils, slopes, or vegetation due to congregating livestock. If livestock fords across streams are rocked to stabilize soils/slopes and prevent erosion, material and location shall be subject to the approval of the refuge manager. Crushed rock shall not be used to stabilize fords. Fords shall be placed on bedrock or stable substrates whenever possible.

34. Silvicultural activities (e.g., herbicide treatment, thinning, and harvesting) shall be limited or restricted on steep slopes and highly erodible soils to prevent accelerated soil erosion and increased sedimentation rates.

35. Fill material used on project sites shall be from non-streambed and non-wetland sources that are free of fines. Deposition of materials shall 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.

Air Quality BMPs:

36. All disturbed areas shall be effectively stabilized of dust emissions using water, approved chemical stabilizer/suppressant, tarp or other suitable cover or vegetation ground cover.

37. 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.

38. 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.